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ORIGINAL COMMUNICATIONS.

ART. I.—TAPE-WORMS IN BIRDS.

BY PROF. JOSEPH LEIDY, M. D., LL. D.
Prof. of Anatomy, University of Pennsylvania.

Birds are as much infested with intestinal worms as other classes of animals, and none appear to be exempt, no matter what may be the nature of their food, though aquatic birds, appear to harbor a greater number of species, as exemplified by ducks and geese. Among the parasites, tape-worms, mostly of the genus tænia, are common, though less frequent than the thread worms. The domestic fowl in Europe has been reported to harbor half a dozen different species of tænia, though I have as yet observed but one with us, and this but rarely. No species I believe has been noticed in our turkey, nor the guinea fowl and pea fowl.

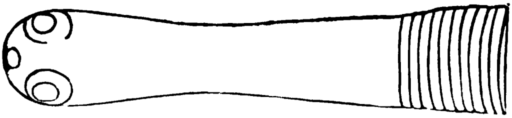


FIG. 1.—Anterior extremity of Tænia microps. 80 diameters.

Dr. J. Van A. Carter, of Fort Bridger, Wyoming, directed my attention to the sage fowl, *Centrocercus urophasianus*, as being much infested with tape-worms. They often occur together in large numbers, sometimes so as to distend the small intestine. The young birds especially are affected; and the old birds appear comparatively exempt. Perhaps this may be due to the individuals much infested being killed off, though the living birds infested, which were observed, appeared not to be suffering in nutritive condition. The species seems to be the *Tænia microps*, Diesing; the same which infests the Capercailzie, *Tetrao urogallus*, of Europe. Its characters are as follows. Head globose or oval, without rostellum or armature, and with a central fovea at the vertex. The four bothria spherical or oval. Neck long, variably narrower than or as wide as the head. Anterior segments, where distinct, about three times the breadth of the length; subsequently seven or eight times the breadth of the length; afterwards again about three times the breadth of the length; then nearly square; next longer than broad; and finally two or three times the length of the breadth. Segments mostly flat, or narrowly elliptical in section, but finally nearly as thick as wide so as to be oval or nearly circular in section. Genital apertures marginal, alternating, most distinct in the middle segments. Ova, in the terminal segments, oval, colorless, with an embryo provided with three pairs of spines.

Length, 9 inches; greatest width, 2¼ lines. Measurements of several individuals were as follows:

No. 1. Length, 28 centimeters. Head, 0.375 m.m. long, 0.45 broad. Bothria, 0.225 by 0.25. Neck, 2 m.m. long; 0.25 where narrowest. Anterior segments, 0.125 to 0.175 long, 0.75 to 1 m.m. broad; middle segments, 1.5 long, 4.5 broad; terminal segments, 2 m.m. long, 1 broad and thick.

No. 2. Length, 11 centimeters. Terminal segments, 1 m.m. long, 4 broad.

No. 3. Length, 17 c.m. Head as in No. 1. Neck, 2.5 m.m. long. Anterior segments, 0.125 m.m. long, 0.3 broad and then 0.45 broad. One-third the length behind, 1 m.m. long, 2.25 broad; terminal segments, 3 long by 1 to 1.25 broad.

No. 4. Length, 15 c.m. Terminal segments, 1.5 m.m. long, 4.5 broad.

No. 5. Length, 22 c.m. Terminal segments, 1.5 m.m. long, 4 broad.

No. 6. Length, 16 c.m. Middle segments, 1 long, 2.5 broad; terminal segments, 2 long, 1.5 broad, 1 thick.

No. 7. Length, 25 c.m. Middle segments, 1 m.m. long, 5 broad; at posterior fourth, 2 long, 3 broad; terminal segments, 3 long, 2 broad, 1.5 thick.

No. 8. Terminal segments, 5 m.m. long, 1.5 wide, 1 thick.

No. 9. Terminal segments, 3.3 m.m. long, 2 wide and thick. Ova, 0.12 m.m. long, 0.08 broad.

Our reed bird, or rice bird, *Dolichonyx oryzivorous*, at the time of its autumnal visit to the vicinity of Philadelphia, I have found to be very much infested with tape worms. Every bunch of a dozen, as obtained in market, will be found to have three or four individuals with the parasite. The worms usually are found in the thin birds, while the fat ones are commonly free; thus apparently indicating by their presence an influence on the nutrition of their host. The species formerly described by me, and since more carefully examined, presents the following characters:

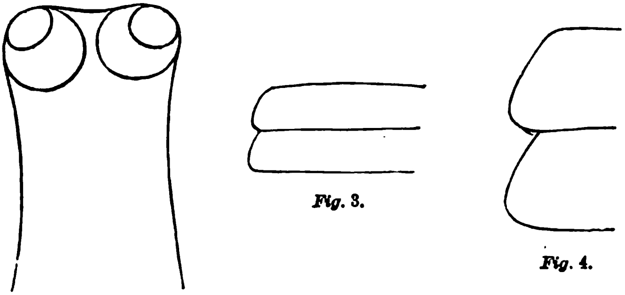


Fig. 3.

Fig. 4.

Fig. 2.

Figs. 2, 3, 4.—Tænia pestifera. 2, head; 3, anterior segments; 4, posterior segments. 40 diameters.

Tænia pestifera.—Proc. Acad. Nat. Sci. 1855, 443. Head quadrate, scarcely defined from the neck, summit truncate, slightly prominent, flat, or depressed, unarmed; bothria large, spherical, occupying the four corners. Neck long, as wide or slightly narrowed from the head. Body gradually widening to the middle and then more or less tapering; anterior segments transversely linear, becoming gradually longer and broader; subsequently obcuneate longer and narrower.

In an apparently complete individual, 3½ inches long, it was widest at the middle and tapering towards the extremities.

Head, 0.75 m.m. broad; middle segments of body 1.5 broad; posterior segments, 0.75 broad.

In a number of individuals the head ranged from 0.25 m.m. long and 0.875 broad to 0.3 long by 1.625 broad. Posterior cuneate segments variably 0.3 to 0.375 m.m. long by 0.5 to 0.75 wide.

I have seen several tape-worms, apparently of the same species, submitted to my examination by Dr. B H. Warren, of West Chester, who obtained them from the yellow-breasted chat, *Icteria virens.*

Prof. S. F. Baird, submitted to my examination a number of tape-worms obtained from the cow bird, ***Molothrus ater***, which I at first supposed to be of the same species as the former, but comparison proves them to be different. Their characters are as follows:

Tænia urnigera.=*T. pestifera* in part, Proc. Acad. Nat. Sci. 1855, 443.

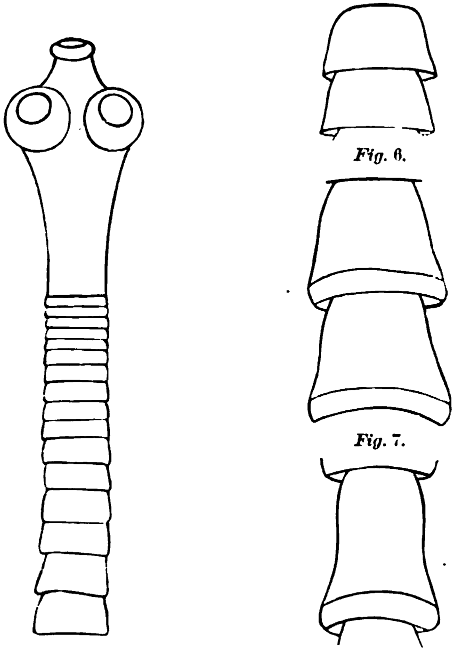


Fig. 6.
Fig. 7.
Fig. 5.
Fig. 8.

FIGS. 5, 6, 7, 8.—Tænia urnigera; 5, anterior part of body; 6, 7, 8, segments from anterior, middle and posterior parts, 40 diameters.

Head urniform or cruciform, summit projecting in a pedicillate rounded knob or disk, or rostellum, unarmed. Bothria spherical, prominent. Neck, short or longer, obconic. Body, narrowest at commencement and gradually widening to near the posterior extremity. Anterior segments narrow, annular, soon becoming cuneate, gradually longer and wider, and then campanulate with prominent back border. Length from 1 to 2 inches, ordinarily about 15 lines; greatest width 0.75 m.m. Head, 0.4 m.m. broad, with neck 0.5 long; commencement of body 0.15 wide; anterior segments 0.1 long, 0.15 wide; later, 0.2 long, 0.375 wide; subsequently 0.25 to 0.75 long and 0.625 wide above and 0.875 at posterior border; a terminal segment 1.375 long, 0.5 wide.

Dr. B. H. Warren, of West Chester, a zealous orinthological observer, has submitted to my examination a collection of intestinal worms, recently obtained by him during an expedition to Florida. Among these are a number of tape-worms, of which most appear to be undescribed species. They are as follows:

Tænia odiosa.—Head hemiovoid to conical, unarmed; bothria subterminal, spherical, near together; neck none; body immediately after as wide or nearly as wide as the head; anterior segments short, linear; succeeding segments all wrinkled annularly, the more anterior band-like, the posterior barrel shaped. Generative apertures lateral, mostly not visible. Length, 1½ to 2 inches. Head, 0.3 to 0.45 m.m. wide; body just behind about as wide as the head; anterior segments 0.05 long; succeeding segments 0.15 long by 1 to 1.25 wide; at widest

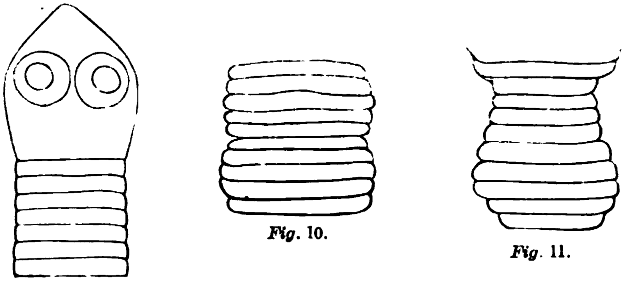


Fig. 9. *Fig.* 10. *Fig.* 11.

FIGS. 9, 10, 11.—Tænia odiosa; 9, anterior part of body; 10, 11, annulated segments from middle and posterior parts of body. 20 diameters.

part of body, 0.5 long by 1.625 wide; posterior segments, 1.25 long by 1.25 wide. From the intestine of the quail, *Ortyx virginianus*, four birds of the same brood.

Tænia viator.—Elongate clavate, broadest behind and rounded at the extremity. Head longitudinally oval or cylindroid, with large, prominent spherical bothria, and with a protrusil, cylindrical proboscis, ending in a disk, but unarmed. Neck short, obconic. Commencement of the body narrowest; early segments transverse linear, the succeeding ones becoming longer, wider and obcuneate or subcampanulate to campanulate, with thickened posterior margin. From 6 to 18 lines long by 1.5 m.m. where widest. From the intestine of the swallow-tailed kite, *Elanoides forficatus*.

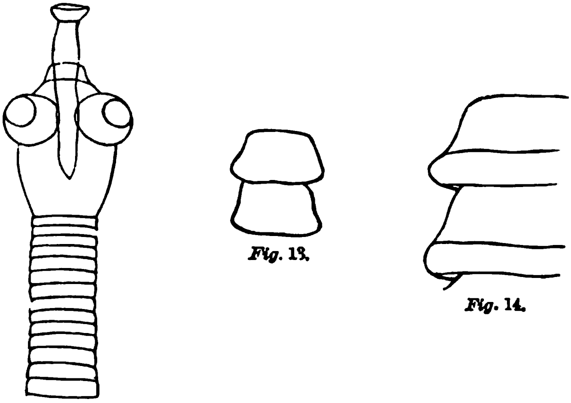


Fig. 13.

Fig. 14.

Fig. 12.

Figs. 12, 13, 14.—Tænia viator; 12, anterior part of body; 13, 14, segments posteriorly. 40 diameters.

Many specimens from two birds. The worms have a yellow color; those from one bird of a bright lemon yellow, and on pressure exuding a bright deep yellow oil.

Head with proboscis, 0.7 m.m. long; breadth 0.425; length of proboscis, 0.2 to 0.3 long, 0.075 wide at middle and 0.125 at terminal disk. Width at commencement of body, 0.2 to 0.225; anterior subcampanulate segments 0.175 long and 0.3 wide; others 0.15 long and 0.45 wide; posterior larger segments, 0.375 to 0.625 long and 1.25 to 1.5 wide. In a specimen 15 lines long after some of the subcampanulate segments

0.15 long and 0.45 wide followed others much elongated 0.625 long by 0.15 wide in front and 0.25 wide behind. In the same specimen the posterior broadest segments were 0.625 long by 1.5 wide; and the last few segments were 0.75 long by 0.875 wide. In the largest segments the genital apertures could be distinguished in one margin; but neither ova nor penis could be detected.

Tænia vexata.—Head armed, transversely quadrate oval, with spherical bothria, variably prominent or retracted, summit convex or depressed, with a broad immersed corona of minute nooks. Neck short or sometimes longer and proportionately narrower; segments of body varying from linear to crateriform and campanulate; the last segment half oval; genital apertures marginal, mostly not readily detected. Length from 9 lines and 1 inch to 2½ inches. Head 0.375 m.m. broad; neck 0.3 broad; widest part of body 1. to 1.25 m.m. broad. Intestine of pileated woodpecker, *Hylotomus pileatus.*

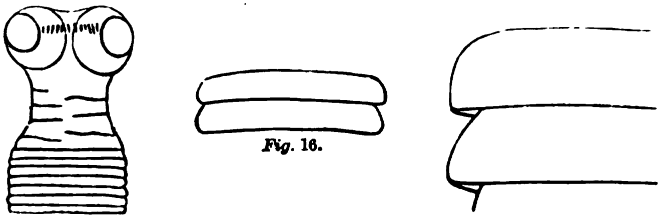


Fig. 15. *Fig.* 16. *Fig.* 17.

FIGS. 15, 16, 17.—Tænia vexata; 15, anterior part of body; 16, 17, segments from more posterior part of body. 40 diameters.

From six birds. In different specimens the measurements were as follows: Head, 0.325 to 0.5 m.m. wide; neck, 0.125 to 0.3 wide; anterior segments, linear, 0.0725 long by 0.25 wide; succeeding, reversed cup-like and variable in proportion of breadth and length according to degree of contraction, 0.175 long by 0.3 wide, or 0.2 long by 0.375 wide, or 0.25 long by 0.75 wide: widest segments reversed crateriform, 0.5 long by 1 wide, or 0.3 long by 1.25 wide, or 0.25 long by 1.5 wide; posterior segments campanulate, 0.375 long by 0.625 wide, or 0.5 long by 1. wide, or 0.75 long by 1. wide.

In a much contracted specimen 1½ inches long, with the widest part 1,75 m.m. broad and proportionately thickened, the head was 0.4 wide, the neck, 0.25, the anterior cup-like segments 0.15 long by 0.2 wide; the posterior widest and thickest part with segments, 0.25 long by 1.75 wide; the posterior companulate segments, 0.75 long by 1. wide. In another much contracted specimen 30 m.m. long, the head was 0.325 m.m. wide; the short neck, 0.225 wide; the widest part with segments 0.3 long and 1.625 wide; the terminal segments, 0.375 long by 1.25 wide. In a much elongated specimen of 2½ inches, the head was 0.375 m.m. wide; the neck, 0.2 wide, the anterior cup-like segments, 0.2 long and 0.375 wide; succeeding segments, 0.25 long and 0.75 wide; next 0.75 long by 1. wide; and terminal ones 0.5 long by 0.8 wide.

In some fragments with broad segments the genital apertures were seen to be distinctly marginal and with a small penis having the summit protruding.

Tænia simpla.—Head short, transverse discoid or hemispherical, slightly prominent or depressed at summit, unarmed; bothria spherical, occupying the four corners; neck, none; body at commencement variably narrower than the head; anterior segments linear, becoming gradually longer and broader and decidedly campanulate. Many fragments, from which the worm is estimated at about 18 lines. Intestine of the chuck-will-widow, *Antrostomus carolinensis.* Head, 0.2 m.m. wide, 0.1 long. Body succeeding head, 0.175 m.m. wide. Campanulate segments, 0.375 long by 0.5 wide; subsequently same length and double width. Some of widest segments, 0.25 m.m. long by 1.25 wide.

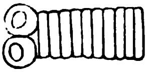


Fig. 18.

FIG. 18.—Tænia simpla; anterior part of body. 40 diameters.

Tænia aurita, Rudolphi.—Head urn-like or doubly conical, summit armed with a double circle of alternating hooks, long and short; bothria lateral, spheroidal; neck obconic; body long, clavate, widening behind and abruptly rounded at the end; anterior segments linear, then linear campanulate, and then more strikingly campanulate with the posterior border thickened. Length to about 2 inches. Head and neck 0.3

m.m. long, 0.2 wide; narrowest portion of body 0.06 to 0.1 m.m. wide; near posterior extremity to 1. m.m. wide. In a small and apparently complete individual of 10 lines, the head was 0.225 m.m long; commencement of the body 0.1 m.m. wide; three lines behind the head the segments were 0.075 m.m. long by 0.25 wide; near the middle 0.15 long and 0.75 wide. Terminal segments 0.2 long by 0.825 wide to 0.25 long by 0.75 wide. A posterior fragment of 15 lines had the anterior campanulate segments 0.125 m.m. long by 0.5 wide and the posterior segments 0.35 m.m. long by 1 wide. Bothria 0.08 m.m diameter. Long hooks 0.048 long; short ones 0.028.

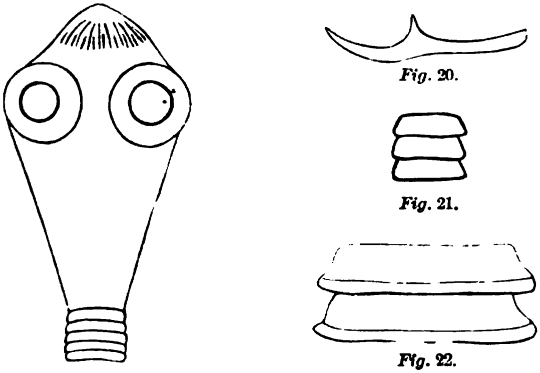


Fig. 20.

Fig. 21.

Fig. 22.

Fig. 19.

FIGS. 19, 20, 21, 22.—Tænia aurita; 19, head, 125 diameters; 20, hook, 500 diameters; 21, 22, segments near middle of body, 40 diameters.

Tænia unilateralis, Rudolphi.—From the intestine of the blue heron, *Florida coerulea.* Previously described from the same bird from Brazil. Head very small, consisting of four small bothria terminating the body, with a minute nail-like rostellum. Neck none. Body rapidly widening from the head. Anterior segments linear; posterior segments short cuneate, with a minute cylindrical penis projecting from each segment, all on the same side. From the intestine of the green heron, *Butorides virescens.* Many fragments. In the only one with the head, 2 inches in length, the head was 0.3 m.m. wide; the rostellum 0.15 long; the widest part of the body 3 m.m.

Tænia oprornis.—Head hemispherical; bothria spherical, occupying the sides of the former; neck none; body at commencement as wide as the head and thence gradually widening to the posterior third and then diminishing. Anterior

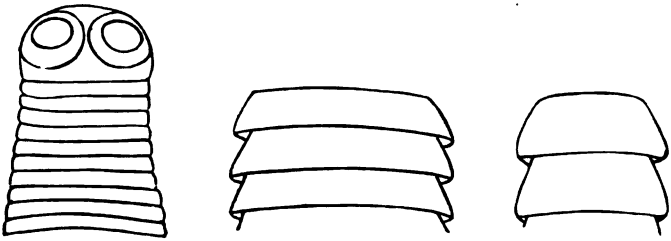


Fig. 23. *Fig.* 24. *Fig.* 25.

Figs. 23, 24, 25. Tænia opromis; 23, anterior part of body; 24, 25, segments posteriorly. 40 diameters.

segments linear and transversely deeply striate; subsequently reversed dish-shaped and finally reversed bowl-shaped. Length about 18 lines. Head 0.375 m.m. to 0.45 broad; widest segments 0.125 long by 0.75 wide; posterior segments 0.2 by 0.625 wide. Several specimens and fragments from the intestine of the Kentucky warbler, *Oporornis formosa.*

A tape-worm from the robin, *Turdus migratorius,* obtained at West Chester by Dr. Warren, seems to be the same as the *Tænia angulata,* Rudolphi, infesting European species of thrushes. Its characters are as follow:

Head broader than long, with spherical bothria at the lateral angles; a short conical rostellum enclosing a conical papilla closely covered with two rows of alternating recurved hooks. Neck none. Body at commencement nearly as wide

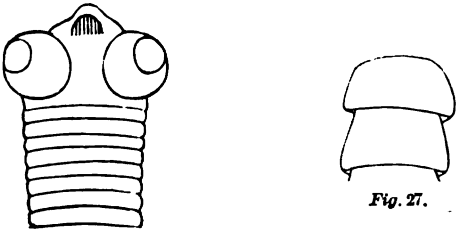
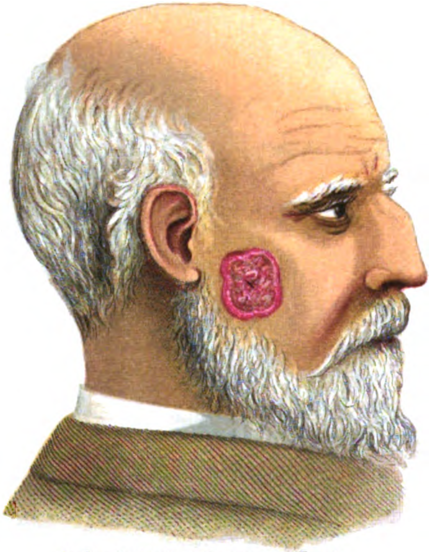


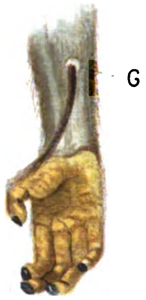
Fig. 26. *Fig.* 27.

Figs. 26, 27.—Tænia angulata; 26, anterior part of body; 27, posterior segments. 40 diameters.

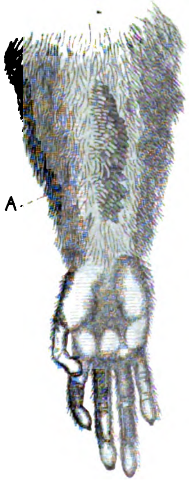
or as wide as the neck, with linear segments; subsequently obcuneate becoming gradually wider; the widest subcuneate



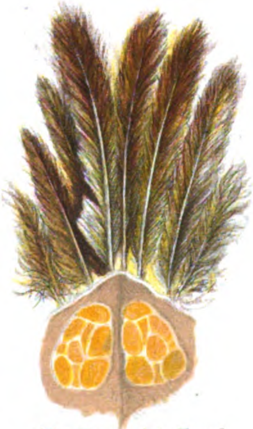
A fungating sebaceous Cyst.
in Parotid region.
Fig.2.



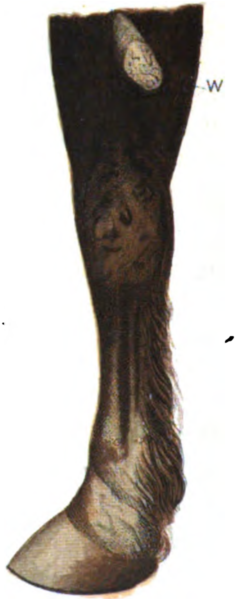
Arm of Lemur Catta at birth,
showing the gland described
in text.
Fig.4.



Hand of Hapalemur griseus
to show the spiny patch A.
Fig.3.



The Uropygial gland
of a Hornbill in section.
Fig.1.



Foreleg of Horse
to show the "Wart"
Fig.5

A Hoen & Co. Lithocaustic Baltimore

twelve times as broad as long. Estimated to be about 2 inches in length, with the greatest breadth about 3 m.m.

In addition to the foregoing, I have observed *Tænia variabilis*, Rud., in our woodcock, *Philohela minor*, previously described from various European wading birds; and *Tænia scolopendra*, Diesing, in the horned grebe, *Podiceps cornutus*, previously described from a Brazilian grebe.

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ART. II.—A COMPARATIVE STUDY OF SEBACEOUS CYSTS AND CUTANEOUS HORNS.

BY JOHN BLAND SUTTON, F. R. C. S.

Sir Erasmus Wilson Lecturer, Royal College of Surgeons, Assistant Surgeon and Demonstrator of Anatomy, Middlesex Hospital, London.

The various structures which arise as differentiations of the integument, and usually included under the term of dermal appendages, are of two distinct kinds: (1) solid structures which are of use in defending, supporting and giving definite form to the organism; (2) glandular organs which are of service in virtue of the secretions they furnish.

To the first group belong such things as hair, nails, claws, hoofs, horns, teeth, bristles, feathers, &c., and to the second, sebaceous glands, their various modifications, sudoriparous glands and the like.

It is to sebaceous glands, in their normal and pathological conditions, that attention will be more especially directed in the present communication.

Like hair, sweat-glands and enamel, sebaceous glands originally appear in the embryo as solid downgrowths or diverticula from the deeper layers of the epiblast. The central portion becomes hollow and receives the secretion provided by the multiplication and subsequent degeneration of the cells lining the walls of the recess.

In man these glands are found wherever there are hairs and the diverticula from which hairs are produced; they sprout from the epidermal cells of the external layer of the root-sheath of the hair. By subsequent branchings from the original downgrowth the more complex varieties of sebaceous glands arise. In very small glands only two or three, or rarely one, recess may be present, in large ones as many as twenty. Their size has no relation to the magnitude of the hair. The fine downy hairs on the nose have very large glands. Klein* points out that the lanugo possesses very large glands, the fine hair being situated, as it were, in the duct of the sebaceous follicle.

In a typical gland the recesses or alveoli possess a limiting membrane, supporting polyhedral cells with oval or spherical nuclei. The central cells are also of this shape and contain minute oil globules.

When the gland is active the cells near the limiting membrane multiply and the product known as *sebum* is forced toward the duct and squeezed, by the gradual accumulation behind, into the neck and mouth of the hair follicle. The duct of the gland is lined with stratified epithelium continuous with the outer root-sheath. Very frequently it happens that the mouth of the duct becomes obstructed whilst secretion continues within the alveoli. The organ thus becomes distended with the outcome of its own activity, and a retention cyst is the result.

Sebaceous cysts of this character occur wherever the glands exist and may vary in size from a pin's head to that of an orange. Their walls may be thin and pliant, or laminated, thick and hard. In the first condition they are formed of thin connective, in the second case composed of tough fibrous tissue. The inner wall of the cyst is lined with squamous epithelium, which may be shed into the cyst in successive layers, giving it a laminated appearance. The contents of sebaceous cysts are usually epithelial scales, granular fatty matter and flakes of cholesterine.

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* Elements of Histology.

In man sebaceous cysts are far more common on the scalp, where indeed they are often multiple, than in any other situation of the body. They may occur on the back, scrotum and perinæum; in the last named situation I have seen one attain the dimensions of an orange.

They arise in the external auditory meatus, and Toynbee, who has carefully investigated these cases, states that they are found chiefly at the inner part of the meatus close to the membrana tympani. In size they vary from a millet-seed to a large nut, and produce by their pressure enormous distension of the meatus and absorption of the petrous bone to such an extent as to open up a communication with the mastoid cells and even the cranial cavity.

The gradual growth of a sebaceous cyst often leads to very extensive absorption of the underlying structures. Pressure effects of this character are, as a rule, best studied in the cranium. Most pathological museums possess one or more specimens, generally of the skull cap, illustrating this form of absorption. The cyst seems to be lodged in a depression the surfaceof which is perfectly smooth and even.

It is somewhat remarkable that when a bone is exposed to gradual but continuous pressure from without, the osseous tissue is absorbed in such a way that the external table remains perfectly smooth and the cancellous tissue is not exposed. I have collected a number of instances in illustration of this fact. It is also true in a measure of other structures. Once I saw the liver of a deer affected with hydatids, in which a very large cyst had pressed upon the anterior surface of the organ, forming a recess nearly an inch deep, yet the peritoneum covering the depression was intact.

There is a remarkable abnornal condition to which the skin of man is liable, known by the name of Xanthelasma. The disease was originally described by Addison and Gull under the name of Vitiligoidea. There are two forms of the disease: (1) a local affection commonly found near the eyelids and called in consequence *Xanthelasma palpebrarum;* (2) a more general form often associated with jaundice and known as multiple Xanthoma.

The first variety generally appears on the skin near the inner canthus, usually involves a portion of the upper and lower eyelid and is remarkably symmetrical. The patches are as a rule flat, smooth, slightly raised and sharply defined; in color lemon-yellow, buff or orange, resembling very closely chamois leather. Histologically they consist of a fibro-cellular growth, infiltrated with a yellowish oil, which may be found in and around the cells. To this oil is due the yellow color so characteristic of the disease. There are good reasons for believing that the affection is really due to pigmentary changes in the sebaceous glands. In support of this view let me tender the following instructive evidence.

Over the coccygx of most birds is a structure referred to as the uropygial gland, which is nothing else than a large sebaceous gland from which the bird derives ointment for its feathers.

If this oil-gland be examined in the Ground Hornbill, *Bucorvus Abyssinicus*, we shall verify the following points. The orifices of the gland are surrounded by a tuft of fine feathers resembling the point of a camel's-hair brush. If the finger be rubbed over this tuft it will be colored yellow. The beak of the bird is of a beautiful orange-yellow color which also stains the finger when rubbed lightly; the yellow feathers have the same effect. A section of the gland shows it to be of a deep orange color, which easily dissolves out in alcohol and in glycerine. Structurally it resembles the sebaceous variety, the pigment is contained in the cells. We have here an excellent physiological type of Xanthelasma. I know of no other example of this remarkable condition of the uropygial gland. In Plate I, Fig. 1, is a drawing showing the general arrangement and disposition of the lobes.

With regard to Xanthelasma, which has now a somewhat extensive literature, I cannot do better than refer the reader to Mr. Jonathan Hutchinson's paper in the Medico Chir. Trans., vol. 54, p. 171, for some excellent drawings of the morbid appearances.

Sebaceous cysts are liable to secondary changes of various kinds. They may be irritated, inflame and suppurate, thus becoming transformed into abscesses as a consequence. This is usually curative. The cyst may burst its capsule as a result of inflammation, the sebaceous matter becomes exposed, putrifies and gives off an odor usually described by the patient as resembling that of a "putrid red herring." The edges of the everted cyst inflame, granulations arise, the margins become elevated and the mass assumes the superficial characters of an epithelioma, for which it is often mistaken even by observers of experience, but the offensive smell is very characteristic. Microscopically it is difficult to draw the distinction, but clinically the difference is decided. The accompanying drawing, Plate I, Fig. 2, represents a case of this kind, which arose in connection with a sebaceous cyst situated immediately over the parotid gland, a not uncommon situation for sebaceous cysts.

Among other rare secondary changes, such cysts are liable to become calcified; of this I have up to the present time seen only one example; it seemed that the calcareous matter was deposited in the *debris* contained in the cyst.

Warts have been known to develop from the lining membrane and project into the cavity of such cysts, but they are rare.

We must consider a curious condition found associated with sebaceous cysts, and one which I propose to deal with very fully in this article, so as to make it the basis of an explanation of some singular structures in animals.

The contents of a sebaceous cyst may burst through the capsule and, becoming exposed to the air, dry, assume a brownish-black color and become very hard. The mass is composed of epidermal scales which in consequence of the exposure resembles horn in appearance and consistence. If the dried mass is allowed to remain, growth continues at the base until at length a cutaneous horn is produced which may be many inches in length.

The most elaborate collection of cases illustrating this singular condition is to be found in a small work by Dr. Hermann Lebert, entitled "Ueber Keratose oder die durch Bildung von Hornsubstanz erzeugten Krankheiten" (Breslau, 1864). This writer gives an account of no less than one hundred and nine cases, with full references, the earliest dating from the year 1300. The horns were found on the scalp, temples, forehead, eyelids, nose, lips, cheeks, shoulders, arm, elbow, thighs, legs, knee, toes, axilla, thorax, buttock, loin, penis and scrotum. In length they varied from a fraction of an inch to as much as ten or twelve inches, and in circumference some of them measured eight inches. The majority of these cutaneous horns occurred on the head.

An excellent account of human horns is furnished by Sir Erasmus Wilson in his well-known work on "Diseases of the Skin," 5th ed., p. 653. Besides furnishing details of some good examples of these abnormal appendages a brief but interesting resumé of some of the more striking cases is given. The Transactions of the Pathological Society of London contain accounts of many curious examples of cutaneous horns, including one which grew from the prepuce of the clitoris.

Elderly females, especially those who are over-cautious lest too much clean water should reach their skin, seem to regard horns with a kind of veneration. But this is not confined to women, for a male patient, who had two horns on his prepuce was terribly alarmed when I suddenly detached them, for a surgeon had warned him that his life depended on their retention. In Fig. 1 two cutaneous horns are represented; the drawing was made from a model in the Museum of the Royal College of Surgeons, London. In this case the abnormal mass is of unusual length.

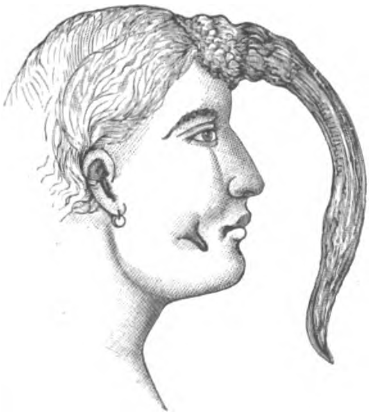

FIG. 1.—Cutaneous horns on the face of a woman. The one on the forehead is five inches long.

Leaving man and extending our inquiries to lower animals, we shall find that sebaceous cysts and their consequences are by no means confined to him. They may occur in horses, dogs, sheep, oxen, and birds.

The Museum of the Royal College of Surgeons, London, possesses specimens taken from the head of a partridge, neck of a fowl, wings and legs of wood pigeons, and the head of a blackbird. It is usual to believe that in birds sebaceous glands are wanting, except in the case of the one over the coccygx, known as the oil or uropygial gland, which is especially developed in water fowl and serves as a store of ointment in which the bird dips its beak and anoints the feathers in the act known as preening. It is a very significant fact that every known bird never has its neck shorter than its trunk; that is to say, it is always of sufficient length to allow the bird to reach the oil gland. This structure is not invariably present, for the struthious birds, some of the *Columbæ*, and others, lack an oil gland. In the pigeon it is bilobed, of a whitish color, and a quarter of an inch in length. A duct which is directed backwards has its orifice indicated by a papilla. Such an oil gland as this, is described as being nude. In others it is surrounded by a circlet of small feathers and is then said to be tufted. The majority of birds have two ducts to this gland. In the Hornbill, as before mentioned, the gland is of a deep orange-yellow color. The presence of sebaceous cysts on the wings of the birds mentioned in the preceding list is sufficient to show that the glands in question must exist in the integument on the inner or ventral aspect of the wings.

A typical example of the affection has recently come under my observation in a cockateel, *Calopsitta novæ hollandiæ.* In this pretty bird a sebaceous cyst had developed on the under surface of each wing. The swellings were symmetrical in size and position. For a drawing of the specimen (which is now preserved in the Museum of the Royal College), the Proc. Zoological Society, London, for 1885, should be consulted.

I have observed undoubted sebaceous cysts not only on the heads of birds, but also of large size in their pectoral region, and the accompanying drawing, taken from the head of a bird in the Hunterian Museum, shows a cyst in connection with the eyelid.

Not merely is there agreement in structure between the sebaceous cysts of birds and animals with those of man, but

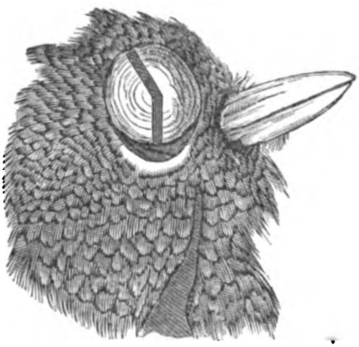

Fig. 2.—A sebaceous cyst with laminated contents in connection with the eyelid of a bird.

they exhibit precisely the same tendency to form cutaneous horns.

As a typical case the following account and drawing of a mule canary will be given. The bird (a cross between a linnet and a canary) is preserved in the Museum of the Royal College of Surgeons, London. It had a sebaceous cyst on the left wing. From this wing there sprouted a horny growth which when removed recurred each year for five years. In the preparation, as it stands in the museum, two of the horns detached are shown in the bottle, but the artist has succeeded in representing the wing with the horn as it appeared during life.

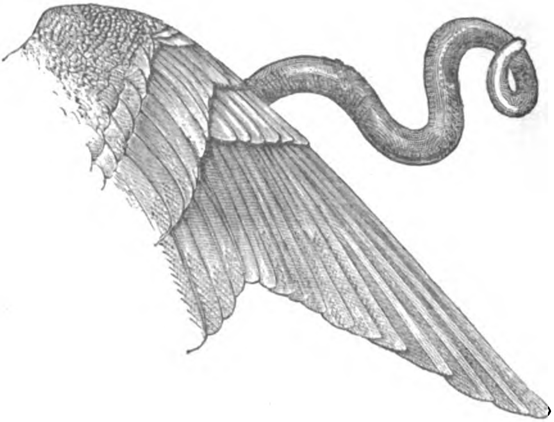

Fig. 3.—The wing of a mule canary with a cutaneous horn growing from it.

As far as my inquiries have extended the existence of such cutaneous horns are by no means uncommon in birds confined in cages.

In the same museum is the head of a cock with one of these horny growths sprouting from the external auditory meatus, as shown in Fig. 4.

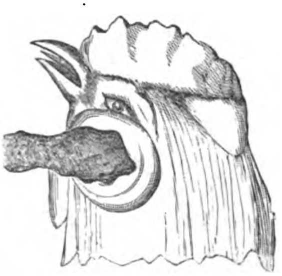

Fig. 4.—Head of a cock with a cutaneous horn, 1½ inches in length, projecting from the external auditory meatus.

This specimen is interesting in connection with Toynbee's observations previously mentioned of the occurrence of sebaceous cysts in the meatus near the membrana tympani.

Hermann Lebert, in the work previously referred to, mentions instances of cutaneous horns growing from the neck of an old hen, the head of a parrot, and in one case on a greenfinch.

He gives references to similar horns in sheep, he-goats, horses, nose of a ram, hare, cows, dogs, and states that Malpighi described one growing from the neck of an ox, ten finger-breadths in length and eight in circumference at the base.

Everard Home, in 1791, contributed an interesting paper to the Phil. Trans., entitled "Observations on Certain Horny Excrescences of the Human Body." After referring to numerous well-marked and extraordinary cases of horny growths occurring in human beings, he describes the following case in a footnote:

A sheep, about four years old, had a large horn, three feet long, growing on its flank. It had no connection with bone, and appeared only to be attached to the external skin. It dropped off in consequence of its weight having produced ulceration of the soft parts to which it adhered. On examining it there was a fleshy substance, several inches long, of a fibrous texture, filling up its cavity, on which the horn had been formed.

In the Teratological collection of the Royal College of Surgeons there is a horn three feet five inches in length and eleven inches in its greatest circumference, said to have grown on the flank of a ram; preserved in a jar near it is the soft core of the same exactly corresponding to Home's description. The specimen is labelled *Hunterian*, and I have no doubt it is the one referred to above. Its shape and general appearance may be inferred from Fig. 5; *A* is the core or fleshy substance to which Home refers.

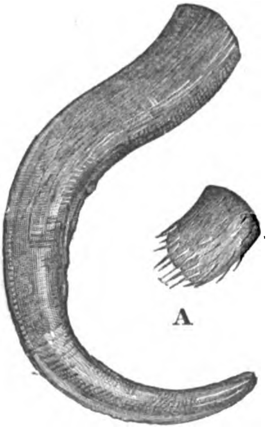

Fig. 5.—Cutaneous horn growing from the flank of a ram; three feet five inches in length and eleven inches in girth.

In the same collection are the two following: (1) A Hunterian specimen described as "the head of a cow, with a very large horn-like appendage growing from the forehead immediately between the eyes. Fig. 6.

A glance at the specimen is sufficient to assure one that it is really a cutaneous horn. The view is confirmed by the examination of some pieces of tissue preserved in spirit and described as portions of the core of this appendage. Their laminated arrangement and general appearance remove all doubt.

The second specimen is the head of a sheep with what looks like an enormous casque growing from its forehead and gives it an appearance not unlike a Cassowary. Fig. 7. It is described as coming from Mr. Swan's collection in 1871. The adventitious mass is of the same nature as that on the head of the cow.

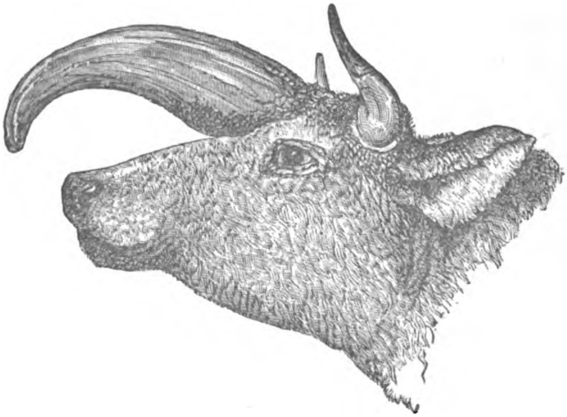

Fig. 6.—Head of a cow with a cutaneous horn growing from the forehead. (Hunterian.)

These specimens from birds, sheep and cows are clearly pathological in their nature and of the same character as human horns. We must now consider some instances of similar structures occurring normally, which shall serve as "physiological types." It is rather remarkable that we need not venture beyond the quadrumana to find the parts in question, and the following observations made upon lemurs serve to illustrate the question in an admirable manner. They are of increased value in that they are additions to our stock of knowledge concerning dermal organs.

In 1884 Mr. F. E. Beddard* drew attention in a paper on *Hapalemur griseus* to a curious structure found on the arm of this lemur.

On the inner side of the fore arm close to the wrist is an oval patch of spine-like processes, about one inch long and one-third of an inch broad in the middle, which is shown in the accompanying drawing (Plate I, Fig. 3). These spines are longest in the middle portion of the patch, and decrease in length towards both extremities. Examined with a hand lens they present the appearance of being composed of a number of fine threads closely bound together; the extremity of the spines is blunt, and the longer ones are somewhat curved and overlap each other. The patch of integument which bears these spines is sharply marked off from the surrounding integument, and no transitional forms between the hairs of the general body-surface and these peculiar spines could be observed.

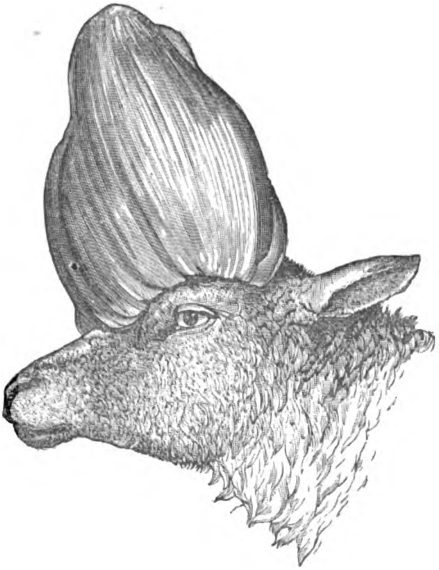

FIG 7.—Head of a sheep with a cutaneous horn growing from it.

When the skin of the arm was removed an oval gland of the size and shape of an almond corresponded to this patch of

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[*] Proc. Zoo. Soc. London. P. 393. 1884.

spines on both arms, but Mr. Beddard was unable to ascertain the existence of a duct in connection with the gland.

It has since been ascertained that this patch is present in the two sexes, but in the female the spines are replaced by hairs, but quite distinct from the rest of the integument of the arm. These facts were furnished to Mr. Beddard by Prof. A. Milne-Edwards and Dr. Jentink after an examination of specimens in the museums of Leyden and Paris.

Dr. Jentink pointed out a somewhat similar structure on the arm of the ring-tailed lemur, *Lemur catta*, which has the form of a horny outgrowth somewhat like the spur of a cock.

At the time Mr. Beddard was engaged in dissecting the Hapalemur he kindly afforded me every facility for examining the structure on the arm of this animal, and the likeness of the individual spines to cutaneous horns was very striking. There is little room for doubt that the patch of spines is the result of the hardening of the secretion poured out from the underlying gland.

We must now turn to the structure on the arm of the ring-tailed lemur, *Lemur catta*, regarded by Dr. Jentink as being possibly a climbing-organ. The structure in question is situated about two inches above the wrist joint, on the flexor aspect, and in a young lemur is about three-eighths of an inch in length. It is of an oval shape, soft, compressible, and marked with fine lines like the tip of the finger, and of a black color. The organ is raised above the general level of the integument to the extent of an eighth of an inch. Its major axis lies in the long axis of the limb, and it is continuous with the palm of the hand by a narrow strip of black hairless skin. The organ is present in the male and female. In older lemurs, a hard callous projection is found on the inner side of this body, recalling in every respect the curious spur or wart-like structure which exists on the inner side of the fore and hind leg of the horse and over the fetlock.

This spur or projection in *Lemur catta* resembles, on a large scale, the spines on the arm of *Hapalemur*, and I have no doubt that they both arise in the same way, viz., by exposure and subsequent hardening of the secretion peculiar to the gland.

I had the good fortune to possess among my stores a fœtal *Lemur catta*, and on the forearm, in the situation of the comb-like structure, a few long hairs exist, as in Plate I, Fig. 4; on detaching the integument a glandular looking patch of the bigness of a millet-seed was found. Microscopical examination proved it to be formed of a cluster of glands resembling the sudoriparous variety in structure and opening by long ducts on to the integument, and apparently unconnected with the long hairs which indicate the spot.

I hope, when more material has come into my possession, to be able to give a full account of this structure; but the curious spur of hardened secretion which forms around its orifice brings it into the category of cutaneous horns.

Apart from their general interest, the occurrence of cutaneous horns in man has a special value to the scientific pathologist. For a long time I have been engaged in analyzing structural aberrations, particularly those which are referred to as repetitions of "physiological types"; for instance, the comb of a cock structurally resembles a nævus; the ischial callosities of a baboon, a corn; the cutaneous horns of men, the nasal horn of a rhinoceros, as Hunter was aware; a myxoma repeats the structural peculiarities of the vitreous humour or the structure of the "jelly" in the umbilical cord, and so on.

With regard to cutaneous horns the question admits of two interpretations. Their occurrence in man may be regarded as atavism or reversion to a former condition, which is of normal occurrence in some animals, *e. g.*, lemur, Hapalemur, &c., or it is purely pathological. If the phenomenon is pathological then the warts on the legs of the horse and zebra (see Plate I, Fig. 5) are to be regarded as pathological productions, which have been handed down until they became race-peculiarities.

The more I study the question the more I see that these two causes have been at work, and it is often difficult to decide whether a given structure is atavistic in its nature or a transmitted pathological production.

In addition to sebaceous cysts arising from obstruction to the excretory duct of the gland there are two other varieties which, on the present occasion, must be mentioned only, their full consideration being reserved for some future occasion.

The sebaceous cysts arising in the neck below the deep fascia, and supposed to originate in connection with unobliterated branchial clefts, differ not only in their ætiology but in their nature from the cysts we have been considering. This is also true of similar cysts in the tongue and a few in the iris.

Some forms of sebaceous cyst of the iris, and others occurring in the fingers, have been very clearly associated with antecedent injury and are to be attributed to epithelial scales on the one hand, and conjunctival cells or eyelashes on the other, becoming transplanted into deeper structures.

These varieties have never been known to produce horns and are foreign to the subject we have been considering.

NOTE.—Since this was written I have found that a cluster of glands underlie the raised oval patch in the adult of *L. catta.* In other Lemurs, as *L. macaco* and *Chirogaleus coquereli,* the gland is present and indicated by a few long black hairs as in the fœtal *L. catta.*

EXPLANATION OF PLATE.

Fig. 1. The uropygial gland of a hornbill, showing the yellow pigment.
2. Fungating sebaceous cyst in the parotid region of a man.
3. Spiny patch on the forearm of *Hapalemur griseus* (after Beddard).
4. Hand and forearm of a fœtal lemur, *Lemur catta*, to show the gland with its long hairs.
5. Foreleg of horse to show the wart.

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ART. III.—A CONTRIBUTION TO THE STUDY OF THE MICROBE OF RABBIT SEPTICÆMIA.

BY THEOBALD SMITH, M. D.

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The accidental discovery of this microbe in two rabbits was the starting point of some experiments with a disease which has already received considerable attention at the hands of Davaine, Koch, Gaffky and others. The following rather incomplete observations confirm the results of the above mentioned observers as to the existence of a specific micro-organism of septicæmia in rabbits, and also call attention to some marked differences in its effects upon animals, indicative of a difference in virulence between what we might call provisionally the European and the American variety. In the following pages the source of the microbe, its microscopic appearance and mode of growth in various culture media are first described; after which is given an account of the inoculation experiments, and finally a comparison between the results obtained and those of former observers.

A lot of ten rabbits purchased for experimental purposes died soon after their arrival, so that in a few weeks only two were left. The animals had been sent by express over a hundred miles from the country. The earlier deaths were, quite naturally, referred to the ill effects of the journey, and stress of work prevented any careful investigation. Two were examined, however, and in one of these, which we shall denominate No. 5, the only lesions were a fibrinous exudate on the left pulmonary pleura and considerable congestion of the kidneys. Cover-glass preparations of the spleen revealed the presence of a large number of oval cocci corresponding very closely, in appearance, to the bacterium of septicæmia in rabbits as described by Gaffky.* In the liver the same forms, in general, slightly larger, were present in large numbers.†

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*Mittheilungen a. d. Kais. Gesundheits amte (1881), I.

†In this connection it might be well to make a few suggestions which have frequently come to the writer in examining cover-glass preparations. The bacteria present in an internal organ, such as the spleen for example, will, as a rule, multiply after death if the surrounding temperature be favorable. This multiplication, we must bear in mind, takes place under changed conditions. The resistance offered by the vital activity of the cells is gone, to be sure, but, on the other hand, the blood and lymph currents are checked by death, which thus limits the food supply. Respiration is interrupted, which forces the bacteria to live virtually without oxygen. To illustrate this fact, we find now and then an active growth of the bacillus of malignant œdema (the spores of which are usually present in the alimentary canal) in internal organs. This growth is probably post-mortem and induced by the absence of oxygen. Nutrient liquids inoculated from such organs always remain sterile. The bacteria multiplying in the tissues of dead animals may under these changed conditions vary somewhat in size. This may serve to explain the larger size of the bacteria in the liver of No. 5. It might be said that the same

A second rabbit (No. 6) had suffered from peritonitis as manifested by the roughened condition of the peritoneum and the adhesion of the coils of the large intestine to one another and to the bladder. The lungs were considerably reddened, the epicardium covered by a whitish exudate which, on microscopic examination, was found to consist almost entirely of oval bacteria. The majority of these were much smaller than those found in No. 5, as if in a state of active multiplication. Now and then an individual could be seen stained precisely like those in No. 5. From this exudate a liquid culture was inoculated in which an immotile oval microbe developed which could not be distinguished from the microbe found in cultures from No. 5, to be presently described. On gelatine plates the colonies of both were identical in appearance. Only two mice were inoculated from this culture, each receiving ⅛ cc. hypodermically. One died on the second day, and in the liver and the deeply congested spleen the oval microbes were present in moderate numbers. No other experiments were made with the germ from No. 6, all the rest being made with cultures derived from No. 5. There is no reason, however, why the microbes from these two sources should not be considered the same.

General characters.—The microbe found in the spleen of rabbit No. 5, and in the animals which died from the effects of inoculation with pure cultures, to be subsequently described, is best studied in cover-glass preparations. A thin film of spleen

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conditions prevailed in both spleen and liver of this animal, but this is only partially true. The metabolic activity of one organ produces substances quite different from those in the other, and the presence of these substances may also affect the growth of the microbes. It is a common observation to note in different liquid and solid culture media slight changes in size and form. So-called involution forms may arise which are characterized by larger size and abnormal shape. Division is retarded and chains of individuals appear often very imperfectly divided. Such observations may be said to represent the aggregate experience of impressions not easily demonstrated to others, but nevertheless convincing to the observer. They indicate the importance of relying, within certain limits, upon dimension and form only when the conditions are precisely alike. Slight variability in the size of the same species of bacteria, according to the culture media employed, is just now beginning to receive some credence, and it emphasizes the importance of testing a given species in all possible media and upon animals in order to obtain definite means of diagnosis. *See Frankel and Simmonds: Die ætiologische Bedeutung d. Typhus-bacillus.* 1886.

pulp is rubbed upon a cover-glass. After the usual manipulations of heating, etc., this is stained in an aqueous solution of methyl violet for 3 to 5 minutes, and after washing and drying, mounted in xylol balsam. Examined with a one-eighteenth homog. objective, the microbe appears as an oval body, which is deeply stained at the two poles of the longer axis, while the central portion is nearly transparent. The stained portions have the form of segments of a circle or crescents; the unstained central portion includes from ⅓ to ½ the optical area of the entire oval. In such preparations the dimensions of the average form are 1.2 μ in length and 8 μ in width. Longer ovals are sometimes observed measuring 1.6μ. In these, the increase in length corresponds to an increase of the unstained area. Shorter forms, 1 u by .6 u are now and then seen. When cultures in liquid media are dried and stained as described, many nearly spherical forms are seen which are smaller and which stain more or less uniformly. If, however, attention be directed to the edge of the dried film, where a large number of bacteria are usually gathered together, many will be found closely resembling those in the blood and tissues as regards size and mode of staining; the smaller forms may result from a rapid multiplication.

The presence of the microbe in the internal organs may be easily demonstrated in sections of tissues hardened in absolute alcohol. They appear very well when the sections are stained over night in aniline water methyl violet and subsequently treated with ½ % acetic acid, alcohol and turpentine, and mounted in xylol balsam. They appear as a rule somewhat smaller than in cover-glass preparations and do not show the polar stain very clearly. In sections of the spleen they are found in groups in the pulp, but not in the malpighian corpuscles. In the kidney they seem to be limited to the larger blood vessels, where they lie scattered among the blood corpuscles. In the liver they occupy the capillaries of the acini in extensive groups. By carefully focussing, these groups are resolved into flat layers attached to the walls of the vessels, but never into plugs clogging them.

If a tube containing some nutrient liquid, such as a neutralized infusion of beef containing one per cent. peptone, be inoculated with blood or other fluid containing this microbe, a faint opalescence is manifested within 24 hours, which is more easily seen on shaking the tube. After a few days a very thin, translucent pellicle appears on the surface of the liquid, gradually thickening into an irregular whitish layer from ½ to 1 mm. thick. If not disturbed this membrane will remain on the surface for weeks. A deposit, on the bottom of the tube, from fragments of membrane and suspended matter, gradually accumulates while the culture liquid once more clears up.* If a drop from such a culture be examined at different stages, in a cell under the microscope, the oval microbes exhibit Brownian movement only. They are therefore *not motile.*

On gelatine plates the centers of growth become visible to the naked eye within 24 to 48 hours, according to the temperature of the room. They appear as minute, spherical sharply outlined masses with homogeneous disc, which is very pale by transmitted light. They do *not liquefy gelatine.* On the surface of the gelatine, they appear as flattish, irregular patches with very thin border. If a tube culture, in a slightly alkaline beef infusion peptone gelatine, be made, by piercing the gelatine with a platinum wire previously passed into the parenchyma of the liver or spleen or dipped into blood, a number of isolated spherical masses will appear in the needle track, within two days. These if numerous may coalesce into a whitish line. The surface growth is quite vigorous. Milk is not altered in appearance after inoculation. Blood serum from the cow does not appear to promote growth better than the nutrient gelatine. On potato no multiplication takes place. The writer has occasionally resorted to a method of stimulating the growth upon potato, of bacteria, which ordinarily refuse it is a pabulum, by saturating the cut surface with some sterile nutritive liquid. This for want of time was not tested for the microbe under consideration. In bulbs containing culture liquid from which the air has been more or less completely exhausted, no clouding takes place. The germ cannot be considered anærobic therefore. Culture tubes inoculated and then exposed to

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*The use of liquid cultures first introduced more systematically by Pasteur, has been almost superseded by the use of solid media in Germany. (See *Med. News*, 1886, Nov. 20).

a temperature of 58° C in a water bath, for 15 minutes remain sterile, those exposed for 10 minutes, become turbid. Tubes inoculated from cultures two to three weeks old, are apt to remain sterile indicating that the microbe does not retain its vitality very long. This fact, together with the low thermal death point, demonstrates the absence of any resistant spore state.

Inoculation experiments.—A gelatine tube culture inoculated by means of a platinum wire from the liver of rabbit No. 5, remained sterile.* A tube of beef infusion with peptone inoculated with a loop of blood from the heart became faintly clouded within 24 hours and contained the immotile ovals only. Two mice inoculated by a subcutaneous injection of a few drops, died, one on the following day the other on the second day. In the spleen and liver of the latter the injected bacteria were present in large numbers, but were absent in the former. A liquid culture from the heart of this mouse contained the injected microbe only.

On June 9th, 1886, a tube of beef infusion peptone was inoculated from a colony on a gelatine plate prepared from the original liquid culture from No. 5. Next day the faintly clouded tube was found pure. Not knowing as yet the nature of this germ, two rabbits (No. 10, 11,) were inoculated by giving them a rather large dose of this culture, ¼ cc. Both rabbits were found dead on the morning of June 12th, within 48 hours after inoculation. At the point of injection, a very thin whitish, pasty looking deposit was found in the fascia covering the muscles, extending over an area of 3 or 4 sq. cm. and consisting of leucocytes and an immense number of the oval microbes. The spleen was gorged with dark blood and friable, the lungs reddened. On the rectum beneath the serosa, and in the meso-rectum were numerous ecchymoses; beneath the corresponding mucosa punctiform extravasations. The stomach was filled with food which was covered with a layer of tenacious mucus. The spleen and liver were crowded with the specific microbe. The lesions in No. 11, closely resembled those just given. There was some serum in the peritoneal cavity and the lesions in the rectum more pronounced, the extravasations beneath the mucosa assuming the form of small bulging hæmatomata. The specific microbe was found in cover-glass preparations of blood from the heart, of the liver, spleen, lung and kidney. Liquid cultures from the blood (heart) and cultures in tubes of gelatine from the liver of both animals contained the microbe of septicæmia as described, all pure. Two pigeons were inoculated subcutaneously, one near the keel, the other in the shoulder, with ¼ cc. of the third liquid culture, 24 hours old, of blood from rabbit 11. One died seven days later during the writers' absence and was not examined, the other remained well for weeks after. A guinea pig inoculated subcutaneously with ¼ cc. and two pigs with 1 cc. each of the same culture were not affected.

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*This preparation of nutrient gelatine was found, later on, not sufficiently alkaline for this microbe.

To determine more definitely the pathogenic effect of this microbe, it became necessary to continue the inoculation experiments. A liquid culture inoculated from the gelatine tube culture of rabbit No. 10 (liver), was faintly clouded in 48 hours. With it the following inoculations were made hypodermically. Two rabbits (No. 12, 13), two guinea pigs and a young rat received ¼ cc. each, two fowls 1.5 cc. each. Of these animals, the rabbits died within 24 and 48 hours respectively. One of the guinea pigs died in 5 days. The others were well three weeks later. In rabbit No. 12, there were about half a dozen small ecchymoses in the connection tissue at the point of inoculation—nothing else. The rapidity with which the virus had acted, left the organs microscopically unchanged, if we except a reddening of the cortex of the kidney. The oval microbe was revealed by its peculiar stain in preparations of the spleen, liver, blood from the heart and kidneys, being least numerous in the last mentioned organ. In No. 13, a whitish thin deposit (pus), had formed in the connective tissue at the point of inoculation precisely like that observed in Nos. 10, 11. The spleen was enlarged, dark, friable, the serosa of part of the small intestine reddened. The specific microbe was present in the spleen, liver, kidneys and blood from the heart in considerable numbers. From the blood pure liquid cultures were obtained. Gelatine tubes inoculated from the spleen and liver of each animal remained sterile. The cause was found to be in an insufficient alkalinity of the medium, as the microbes grew vigorously in another more alkaline preparation of gelatine inoculated from the blood cultures. In the guinea-pig there was slight engorgement of the blood vessels, at the point of inoculation. Severe peritonitis was indicated by an inflammation of the serous covering of the abdominal walls, the intestine and bladder and some effusion. The spleen was enlarged, dark, very soft; the liver almost pulpy and covered with a gelatinous exudate, about ½ mm. thick, readily peeled off. Lungs œdematous and congested; a few subpleural ecchymoses present. Bacteria were few in number in the internal organs. Two liquid cultures of the blood were found pure next day.

These results were confirmed by another series of inoculations, in which the microbes were introduced beneath the skin on a platinum loop directly from gelatine tube culture (Nos. 10, 11, liver). The skin having been incised, the zooglœar mass was introduced into the small pouch thus made. In this way two mice were inoculated from rabbit No. 10; from No. 11, one rabbit and three pigeons. One mouse died three days later. No microbes in spleen or liver. The other mouse and the pigeons remained permanently well. The rabbit (No. 14) showed some lameness, though continuing to eat until it was found dead one week after inoculation. The lesions in this animal were different from those of the preceding cases. The seat of inoculation on the thigh was occupied by an extensive patch of whitish pasty infiltration, which was continued as two thick cords along the median portion of the abdomen as far as the sternum; the lateral aspect of the abdominal wall, on the inoculated side was likewise infiltrated with pus, which contained numerous oval microbes staining very feebly. The abdominal cavity was invaded by an intense plastic peritonitis, matting all the viscera together with a blood-stained gelatinous exudate. The large intestine was covered with patches of extravasation. The specific microbe was present in very small numbers in the various organs. Two liquid cultures from the heart were pure, none others were made. This peculiar case will be discussed later.

The results thus far pointed to a comparative insusceptibility of all but the rabbits; these seemed to possess no power of resistance. A final trial was made to confirm these results. A liquid culture, one day old, prepared from a gelatine tube culture of rabbit 13, faintly turbid, and containing the characteristic microbe only, was used. Three mice received each $\frac{1}{8}$ cc., one young guinea pig $\frac{1}{4}$ cc., two fowls and three pigeons 1 cc. each, two rabbits $\frac{1}{40}$ and $\frac{1}{8}$ cc., respectively. Of these animals the fowls and guinea pig remained unaffected. The three mice were sick for some days but regained their wonted activity. The two rabbits died within 48 hours after inoculation. Two out of three pigeons died in four and six days respectively. In rabbit No. 16 (which had received but $\frac{1}{40}$ cc.) there was considerable local reaction; the muscular tissue over an area of a sq. cm. was softened; over the muscles of the thigh, on the inner aspect, there was a thin pasty layer of pus, with scattered points and patches of extravasation. The suppurative change extended towards the dorsum in a thick cord-like mass, involving a portion of the lateral wall of the abdomen, which was whitish and softened. Beginning peritonitis manifested by delicate strings of exudate across the intestines. Liver pale, spleen enlarged, dark and soft, cortex of kidney injected. Bacteria comparatively few in spleen and liver, quite numerous in blood from the heart. A liquid culture from the heart and a gelatine tube culture from the liver were both pure. In rabbit No. 17, which had received at least five times the quantity given to No. 16, the local reaction was limited to a slight infiltration of the fascia covering the muscles. The gall-bladder was distended and the surrounding tissues stained with bile. Other changes like those above described. Both spleen and liver contain numerous microbes, the heart but few. Successful cultures made from blood and liver.

In one of the pigeons (No. 3) which had received 1 cc. beneath the skin and died in four days, the muscular tissue was slightly necrosed superficially, forming a brownish-red sequestrum. The specific microbe was abundant in spleen and liver. A liquid culture from the heart and a gelatine tube culture from the spleen contained this microbe only.

The other pigeon had been inoculated by pushing the needle into the muscular tissue of the pectoral making it an intra-muscular injection. The necrosis in this case was more extensive and deeper. On section it was more or less honeycombed, including small masses of normal muscular fiber. No bacteria was found in the internal organs and a liquid culture from the heart remained sterile.

The disease was thus transmitted, by means of pure cultures of varying age, from rabbit No. 5 to Nos. 10 and 11; from No. 10 to Nos. 12 and 13; from No. 11 to No. 14, and from No. 13 to Nos. 16 and 17. The inoculated rabbits invariably succumbed, nearly all within 48 hours. Opposed to these very positive results we have chiefly negative ones to record with reference to other animals. Three out of four guinea-pigs and 4 fowls proved insusceptible, and but 3 out of 7 pigeons died. Even mice require a large dose. It is very probable that none of these animals would have been killed by the minimum dose needed to kill a rabbit, when we consider the comparatively large quantities with which they were inoculated. We must therefore regard the disease as peculiar to rabbits, unless we are dealing with an attenuated variety.

The experiments are too few in number to warrant any extensive generalizations, but it may be well to suggest a few lines of thought which may lead to further investigation. In glancing over the autopsy notes, we find that the local reaction grew in intensity with the duration of the disease, that the smaller dose produced the severer reaction, that cultures not suspended in liquids (*i. e.*, in masses from gelatine culture) act like small doses of liquid cultures; and finally that a very slight local reaction is associated with an abundance of bacteria in the blood of the internal organs. For these rather strange phenomena we would offer the following explanation: When introduced beneath the skin the bacteria may become disseminated and multiply in the lymph or blood channels. Those that enter the blood meet with a greater resistance than those in the lymph channels, hence, when a small quantity is injected, those that enter the blood vascular system are either destroyed or are placed in conditions in which multiplication is prevented. Meanwhile some follow the lymphatics, multiply, induce suppuration and inflammation of the large serous cavities. When large quantities are injected the resistance of the blood is overcome at the outset, multiplication goes on rapidly, and after death the bacteria are found in abundance in all the organs, though a local reaction may be absent. In the former case they are few in number, although the disease may be prolonged with extensive local lesions.

When the bacteria are introduced as they grow upon solid media, in a mass, we obtain the effect of a small liquid injection (rabbit No. 14), probably because they are not in a condition to be rapidly carried into the circulation. The bacteria creep along the lymphatics, invade the serous cavities and finally produce death. In this case also the disease is prolonged, but the organs contain few bacteria after death.* An injury to a blood vessel at the time of inoculation might materially change the anticipated results.

This microbe was first studied by Koch,† who produced the disease by the subcutaneous injection of putrid meat infusion. At the same time, Koch describes another disease produced by injecting putrid substances—pyæmia in rabbits—in which the local lesions and extensive peritonitis remind us of a few of the cases described in the preceding pages. This disease was caused by small micrococci (.25 μ), while in the writer's experiments pure culture of the microbe of septicæmia were obtained from these same cases. Somewhat later the same disease was studied by Gaffky.* Rabbits and mice invariably

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*The fact previously mentioned that bacteria are apt to multiply *post mortem* must not be forgotten in this connection. Experimental animals die most commonly at night. When the temperature is very high, as during the summer months, there may be an appreciable increase in the number of bateria before an examination can be made. This important fact has been forced upon the writer's attention in other investigations and has been noted by Frankel and Simmonds in typhoid fever (*loc. cit.*) These investigators made use of the *post mortem* multiplication of the specific bacillus of this disease in studying the disposition of bacillar groups in the spleen. This organ, removed *in toto*, was wrapped up in a cloth saturated with a solution of mercuric chloride and kept in a warm room for a certain length of time, usually for one or two days. It must also be borne in mind that bacteria multiply *in situ* after death. The cessation of all circulation will prevent their distribution. Hence an organ comparatively free from bacteria at the time of death would remain so, while one in which they are widely distributed would contain large numbers after a time, there being many centers of multiplication.

† Wund infectiouskrankheiten S. 59.

succumbed to inoculation in from 16 to 20 hours. There was no local reaction. Its absence might be explained by the brief duration of the disease, for, in the cases recorded in the preceding pages, the severity of the local lesion was proportional to the duration of the disease, there being none whatever in one (rabbit No. 12), which died within 24 hours after inoculation. In producing the disease originally by the injection of contaminated water, Gaffky found a case of peritonitis, which he regarded as due to another microbe, although the microbe of septicæmia was present in the blood. In view of the above experiments, we should consider the peritonitis as belonging to the disease, more especially as it lasted over three days. Gaffky found fowls pigeons, and sparrows susceptible, but guinea-pigs and white rats insusceptible. The microbe remained virulent for months in artificial cultures.

Dr. Cheyne, in some recent experiments on the conditions of infection,† states that the experiments of Koch and Gaffky with diluted blood from septicæmic rabbits, leave no doubt that even a single microbe is sufficient to kill a rabbit. He himself endeavored to determine the number necessary to destroy guinea-pigs. The injection of small doses proved fatal to nearly all. A peritonitis developed in some cases, in others the microbe seemed to be most abundant in the blood. Gaffky found guinea-pigs insusceptible. The discrepancy may be due to the size of the dose and the mode of inoculation.

The microbe found by Dr. Sternberg in his own saliva, which produces septicæmia in rabbits,* differs both morphologically and in its pathogenic effect from the microbe under consideration.

Taking into consideration all the facts concerning this microbe‡ which have been brought to light by these observers, we must adopt one of two views. The microbes under consideration may be entirely different specifically, or else the one found by the writer may be an attenuated form which has lost the power of multiplying in all animals but the rabbits. This is a more plausible assumption than one which would credit American pigeons, fowls, etc., with a greater power of resistance. Though some of the pigeons inoculated by the writer died, they cannot be regarded as really susceptible organisms, a susceptible animal should succumb to a minute dose, and these received large ones. A micro-organism which has marked pathogenic properties with reference to one species must necessarily be injurious to other animals, if only in a slight degree. When introduced into the system in large numbers, it may be able to reduce suddenly the vitality of the animal sufficiently to gain permanent foothold and finally destroy it. The same reasoning might be extended to the mice and the guinea-pig. This argument, however, does not invalidate the use of large quantities of virus in studying its effects upon comparatively insusceptible animals.

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* Mittheilunger a. d. Kais. Gesundheits arute I, S 93.

† *British Medical Journal.* 1886–ii., p. 203.

‡ This organism illustrates very well the change in terminology which has been going on in the field of bacteriology. It was first described by Koch as a micrococcus; Gaffky called it a bacterium and in the recently published tables of Eisenberg (*loc. cit.*) which were compiled under Koch's supervision, it is called a bacillus. The original name of micrococcus seems most reasonable.

* Am. Jour. of Med. Sciences, 1885, p. 106; 1886, p. 123.

It has been asserted that the microbe of rabbit septicæmia and of fowl cholera are probably identical. This assertion, based upon that of German investigators, cannot be sustained with reference to the microbe under consideration. Moreover, a recent observer, who, without doubt, had the real virus of fowl cholera, describes the microbes as spherical cocci .3 to .5 μ. in diameter.* There may be two forms in Germany to which fowls are susceptible, one identical with the microbe of rabbit septicæmia, the other a true micrococcus. Whether both are capable of causing epidemics, or whether one only is the true virus of fowl cholera, as observed by these investigators, can not be answered on this side of the Atlantic.

The question as to the distribution in nature of this microbe is of considerable interest, involving, as it does, the more important one of the distribution of all the so-called ubiquitous pathogenic micro-organisms, which produce suppuration, septicæmia and pyæmia in man. Assuming that the microbe first described by Koch, and studied more min-

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*Deutsche Ztschr. *f.* Thiermedicin u. vergl. Pathologie. Supplement, 1885.

utely by Gaffky, is identical specifically with the one now under consideration, but one of them modified by conditions not at present determinable, it may have a wide distribution and yet be very rare. Koch produced it twice by injecting putrid meat infusion. How often putrid substances were injected into rabbits before these two successful cases were obtained, is not stated. Gaffky remarks, however, that injections were made by Koch upon a large number of animals before this specific form of septicæmia was produced. The same difficulty was experienced later by Gaffky, who succeeded at first with water from a contaminated stream in Berlin (Panke), but as the weather grew cold this source of the microbe also failed. In this connection the question arises, How were the two animals infected which furnished the writer with the original cultures? They are the only cases of spontaneous origin on record, as they had all been obtained from the country in a healthy condition. We may assume that the microbe lives and retains its virulence outside of the animal organism like the virus of anthrax, and gains entrance through some lesion of the skin. Unlike the bacillus of anthrax, its feeble growth in artificial media stamps it as no very hardy germ.

There are many other problems concerning this germ left unsolved, such as the effect of feeding, of inoculation upon animals with the septicæmic blood itself to determine any possible attenuation in cultures with reference to the animals not found susceptible, its resistence to various mechanical and chemical agencies, etc. The experiments and observations recorded seem to demonstrate fairly well the following points:

1. There is a microbe distinguishable by definite morphological and biological characters which is invariably fatal to rabbits, but which has only a feeble pathogenic power with reference to guinea-pigs, mice, pigeons, and fowls.

2. The kind of lesions consequent upon subcutaneous inoculation in rabbits and their severity depend upon the number of microbes introduced and upon the mode of inoculation.

September, 1886.

ART. IV.—SNAKE POISON FROM A CHEMICO-PHYSIOLOGICAL POINT OF VIEW.

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It has occurred to me that an account of the careful and thorough researches made recently into the nature of snake-poison might prove interesting to the readers of this JOURNAL and form a fitting sequel to the graphic paper of G. A. Stockwell, which appeared in the October number.

That the real nature of serpent venom should so long have been overlooked was largely owing to the stereotyped nature of our conceptions as to the class of bodies to which a poison must, as was thought, belong.

That a poison might be neither an acid nor an alkaloid, if of an obscure nature, was scarcely dreamed of till very recently, even by chemists and physiologists. A Commission was appointed to investigate snake-poisoning so far as India and Australia were concerned, which reported in 1874. Their work was valuable and suggestive, but incomplete, especially from the chemical side.

The first valuable chemical investigation of serpent venom was made by Prince L. Bonaparte, in 1843. After examination of the virus of an adder (pelias verus), he concluded that the essential poison was associated with the coagulum produced by alcohol.

In 1861 Weir Mitchell obtained from rattlesnake poison an "albuminoid body," which he named Crotaline, by treating the filtrate from the boiled venom with alcohol.

It would appear then that Weir Mitchell was the first to recognize what the latest investigation have made perfectly clear—that snake venom is a proteid body. A chemical analysis of the venom by Armstrong, in 1873, proved it to consist of C. H. N. O. S. and P., which, so far as it went, was in favor of its being a proteid.

But the whole matter was in a most unsatisfactory state till quite recently, when it was very thoroughly investigated chemico-physiologically by Weir Mitchell and Reichert in America, and Wolfenden in England; and it is gratifying to find that upon essential points these independent investigations have arrived at the same conclusions. Weir Mitchell and Reichert have worked conjointly upon the virus of the American rattlesnake, the moccasin and the copperhead; Wolfenden on that of the Indian cobra and the Indian viper.

From the rattlesnake and the moccasin the first two observers obtained three proteids; of these they consider one to be a *peptone*, another from moccasin venom they rank as a *globulin.*

From this venom Wolfenden obtained a globulin, but only traces of peptone.

He, however, disputes the grounds on which the first named investigators base their conclusions as to the nature of their "peptone" and "globulin," and would place the substances which they thus designate among bodies intermediate between true albumins and peptone.

Notwithstanding this difference as to details, the fact remains that these observers are agreed that the active principles of snake venom are proteid and as proteid in character.

As fresh snake venom is acid in reaction, investigators were led to look for some special acid which should account for its toxic properties.

Winter Blyth, in 1876, prepared and figured what he called cobric acid, and considered the sole active principle. Wolfenden recently undertook, by careful examination, to settle the matter. He has shown that there is no such acid; that the crystals of Blyth are really sulphate of lime, and suggests that the acid reaction of the venom may be due to the presence of *acid albumin*, at least in some cases.

The specimens of cobra poison examined contained fat; and crystals of fatty acid were obtained. Wolcott Gibbs had previously negatived Blyth's view in regard to "cobric acid.

But all three of these observers are agreed as to the absence of any alkaloid whatever. It has been further shown that the toxic action of snake venom is not due to the presence of any microbe, nor any ptomaine (if it be necessary to mention the latter after stating the absence of alkaloids).

If acids, alkaloids and germs may be excluded, of what then does the power consist?

Cobra poison consists solely of proteid matter and of the following kinds:

1. Globulin, always present; probably kills by interference with the respiratory mechanism (asphyxia)—without paralysis—causing local inflammation, but not of great intensity compared with viper venom.

2. An albumin resembling *acid albumin*, which is precipitated along with globulin by saturation with a neutral salt and which is in some degree dialysable. This body acts probably on the respiratory apparatus, chiefly like globulin, but less powerfully.

3. An albumin precipitated by sodium sulphate from the magnesic filtrate, and which is *serum albumin*. This produces ascending paralysis, ending fatally by interference with the muscles of respiration.

4. Traces of *hemialbumose* and questionable traces of peptone. "I regard these as accidental, and probably due to the length of time the poison has been kept" (Wolfenden). In viper poison was found also the preponderating globulin, serum albumin and a body allied to acid albumin, probably an albumose. Weir Mitchell and Reichert found in their venoms globulin, albumoses and peptone, though the presence of this latter body is not beyond dispute.

These conclusions have been arrived at by the use of methods which, so far as can be seen at present, are almost perfect; and these researches, viewed historically, demonstrate the importance of thoroughly reliable methods. Details would be out of place in such a paper as this; but suffice it to say that the methods are not wholly new, but have been tried in other fields of investigation.

It is now clear why other investigators, using methods less reliable, came to the conclusion that the toxic action of snake venom was due to some alkaloid, acid, etc.

The fact was that these observers had in their filtrate bodies which were really proteid, but which at that time were not suspected of bearing that character, because the chemical properties of that class of bodies were then much less perfectly understood. These recent investigations show that it is most difficult to prevent some of these proteid matters from passing through filters and dialysers. They clearly demonstrate that the toxic action is due to the presence of a proteid in solution (not suspension); that in the absence of the proteid the effect does not follow; and that the effect is proportional to the quantity and kind of proteid present. All this has been actually shown by *experiment* and is not a priori inference.

In order to test the action of these bodies, injections were made into the blood of various animals and the results carefully noted.

The ordinary symptoms of the Indian viper poisoning are not constant but may cause death in one of three ways:

1. Primary convulsions.
2. Convulsions and paralysis.
3. Blood poisoning.

Its local effects are very marked, gangrene not being uncommon.

In viper poisoning there may be early cardiac embarrassment and speedy fall of blood pressure, sufficient even to cause death of itself.

It is well known that acid albumin is formed during peptic digestion; that globulin and serum albumin occur in blood serum and as Kühne first showed, the albumoses also are formed during artificial digestion, at least, while peptone has long been recognized as a final product of proteid digestion.

At first one is somewhat startled to find that these very bodies belong to the same class as those constituting the yellowish poison of serpents.

But peptoric, if absorbent at all as peptone from the alimentary canal into the blood, enters very slowly, and may possibly be changed into some other proteid. Our physiological chemistry has advanced far enough to show that there are globulin and globulins, etc.; that is to say bodies which while having much in common yet show chemical and still greater physiological differences. And, after all, our knowledge of the real chemical constitution of all proteid bodies is in a very crude state.[1] Their molecular constitution is unknown. Many puzzling questions arise in connection with this and other topics it suggests.

What most impresses me is, on the one hand, the crudeness of our chemical knowledge and, on the other, the extremely delicate, we may say subtle, character of the mechanisms in a vital organism. But certain recent investigations of Pallitzer and others have brought us face to face with some new and impressive facts.

It has been shown that peptone, a peptone prepared by artificial digestion, and the albumoses prepared in a similar way, when injected into the blood of an animal produce *narcotic poisoning;* but curiously enough those bodies are without the slightest effect on some animals, as the rabbit. Pallitzer has shown that in several genera of animals, the *coagulability* of the blood is delayed or totally prevented; that the *blood pressure* sinks markedly, probably owing to voso-motor paralysis and manifesting itself chiefly in the splanchine area. The fact that the narcosis lasts only so long as the blood pressure is low, points to cerebral anæmia as its probable cause.

But peptone is never fatal while the kidneys are intact, for it is a diuretic and is eliminated rapidly; but a sufficiently large dose of the albumose is always fatal. Here then are examples of bodies, which, according to our chemistry, are very much alike, but which have a physiological action so different that one is fatal and the other not necessarily so. A body with identical ultimate chemical composition, even to the same quantity of each element may, as is well known, possess an entirely different molecular constitution with correspondingly unlike properties and physiological action; hence it is possible to understand why the globulin of snake poison should have a different effect from that which we prepare in the laboratory.

It is, of course, open for us to believe that the toxic properties of snake venom may be due, not to the proteids it contains, but to something associated with these, but not yet isolated; for such a view there is at present no positive evidence. But assuredly there are more things in heaven and earth than are dreamt of in our philosophy.

It is true no antidote for snake poison has yet been found;

but with the strides science is making, I am not hopeless that some way may be devised for the rescue of the victims of serpent bites, be it a genuine antidote or something else. The fact of the speedy and total ruin of hosts of blood corpuscles is serious; but if at a certain point this could be stayed and the poison neutralized or eliminated, the great creative power of the body, in the renewal of its tissues, including the red cells of the blood, might suffice to meet the emergency.

I should be inclined to hope and believe that man will ultimately prevail over the actual serpent as he is over the allegorical one.

ART. V.—COMPARATIVE OPHTHALMOLOGY.

CLINICAL OBSERVATIONS.

BY L. WEBSTER FOX, M. D.
Philadelphia, Pa.

CATARRHAL OPHTHALMIA.—(Pink-Eye.)—During an epidemic of influenza rife among the horses, in and about Philadelphia several years ago, many hostlers, drivers, and cabmen came under my observation, suffering from catarrhal ophthalmia, with a history that this disease was contracted while handling horses suffering with "pink-eye," as it was vulgarly termed. Extending my researches into this field of comparative ophthalmology, I elicited many interesting clinical facts, and, at the same time alleviated much suffering, not only in human beings but in animals, by the proper application of certain remedies.

As to the infection of the disease which always acccompanied the influenza, there was no doubt. It was observed that where one horse became afflicted, his neighbor would in a short time show evidence of the infection. There being many avenues through which the cocci could be conveyed, especially when horses are crowded together, as of necessity they are, in large stables, that it is impossible to enjoy immunity against contagion. Conjunctivitis is much more common among horses than would be supposed by the casual observer. Müller, in the *Berliner Poliklinik*, found, among 3784 diseased animals 160 suffering from conjunctivitis, a very high percentage when it must be remembered that animals suffering from conjunctivitis are rarely entered at such an institution for such a disease. In man, the disease was local, only affecting the conjunctiva, while in the animal, the mucous membranes of the eye and nostrils were alike affected, with accompanying symptoms of chill and fever.

The disease in horses, dogs, and cows is preceded by a period of photophobia, lachrymation, swelling of the lids, yellowish discoloration of conjunctiva and iritis. In from ten to twenty-four hours these symptoms grow worse, involving not only the cornea, but the uveal tract as well. Schindelka found in several cases keratitis parenchymatosa, and uveitis. Vogel found the conjunctiva swollen to such a size that the lids could not be closed. These conditions are only found in the aggravated forms of the disease. From 24 to 36 hours after the first symptoms manifest themselves, we have profuse muco-purulent discharges from eyelids and nostrils. Upon close inspection we find the conjunctiva of the lids swollen, congestion and engorgement of the capillaries, at times subconjunctival hemorrhages, the cornea steamy, pupil contracted, and reacting to light feebly, the ocular folds much swollen, while the orbital tissues became infiltrated.—(Dieckerhoff.) These symptoms are usually accompanied by pain, loss of appetite and drowsiness. By watching the eye symptoms, we can judge of the progress of the disease, as they continue throughout the fever; an improvement in the ocular symptoms is indicative of convalescence.

It may be interesting from a bacteriological point to mention that the disease does not assume that same degree of virulency in man. Whether the secretions from the conjunctiva of man do not form as productive a medium for the full development of the micro organisms, remains for future investigation. But the secretions produced in man by the *cocci* from the horse reproduced themselves when applied to a healthy conjunctiva, as I have had several families under treatment where but one individual was affected primarily, he in a short time communicating the disease, by the aid of a basin, to other members. In the treatment of the disease it falls to my province to deal with ocular symptoms only. The swelling of the lids must be relieved, as well as the discharges stopped as soon as possible. The continued pressure producing keratitis, which may end in *ramollissment* of the cornea, followed by prolapse of iris or iritis, and by choroiditis, ending in loss of vision. The eye should be bathed frequently with warm poppy fomentations, and the following collyrium applied to the eye-ball four times daily with a small syringe:

℞.	Zinci chlor.		grs. iv.
	Hydrarg bichlor		grs. $\frac{1}{30}$
	Aq. camph.		
	Aq. destil.	āā	℥ ii.
M.			

In keratitis complicated with iritis, atropia sulph. grs. iv. to ʒ i. must be applied to eye-ball three times daily.

CHOROIDITIS.—A valuable horse was recently brought under observation with the following history: The keeper noticed a haziness of the right cornea, congestion of the sclerotic blood vessels, and the vision apparently disappearing. In two months the cornea of the left eye assuming the same condition. At this time I made an examination of both eyes. The right eye was totally blind. The cornea clear, but iris bound to the capsule of the lens, which was cataractous. The left cornea was steamy, and iris discolored; after dilating the pupil, the ophthalmoscope revealed marked choroiditis, which was recognized by the marked disturbance of the tapetum. The vision was very much lessened, as the animal was clumsy and would walk against objects. Owing to the iritis and choroidal change an unfavorable prognosis was given.

The treatment instituted was atropia sulph. grs. iv to ʒi, to dilate and rest the, iris while 40 grs. of potass. iodidi, three times daily was.given internally. An issue was also placed in the skin, at the angle of the jaw. The treatment was continued for two weeks with marked benefit, at this time the vision had improved, and the acute symptoms had disappeared. The owner since informing me that the animal could avoid obstacles with comparative ease. From the uninterrupted train of symptoms, this case suggests itself as being one of sympathetic ophthalmitis; the energetic treatment preventing total loss of vision. The ophthalmoscope which aided in the discovery of the above disease should never be omitted in certain obscure visual defects in animals, although the field of this department cannot be as extended and useful as in man, yet all students of veterinary medicine should give it their careful consideration, bearing in mind, however, that the fundus oculi of different animals presents a different picture, on account of a different distribution of the arterial and venous system, as well as the deposit of pigment. That of man and the pig are alike, yet that of the horse and cow differ from that of man.

In using the ophthalmoscope we have two methods, the *direct* and *indirect*. In our experience we have found the indirect the most useful. Its practical application is as follows: we use a 9-inch concave mirror, of about 2½ inches diameter and placing a light in front or above the animal's head we reflect into the pupil an image of the flame, while the examiner looks through the perforation in the center of the mirror, standing about 16 inches away, we interpose a + sph. 2-inch lens before the eye, resting the little finger on the brow; the aerial inverted image is now formed of the fundus oculi. The brilliant reflex from the tapetum varying with the color of the animal.

Recently,* Drs. Lang and Barrett, of London, published an interesting article on *The Refractive Character of the Eyes of Mammalia.* While the authors lament that their results can only be regarded as approximate in character, yet they must be congratulated upon furnishing statistics which are highly interesting to all students of comparative ophthalmology. Their mode of examination was by retinoscopy, the light being thrown into the fundus oculi by means of a mirror with a focal distance of 25 c.m. If the fundus reflex traveled with the mirror, the animal was myopic (near-sighted), if the reflex moved in an opposite direction the animal was hyperopic (far-sighted).

The examinations by the direct method were unreliable and impracticable. Of 185 eyes examined, 24 were emetropic

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*The Royal London Ophthalmic Hospital Reports, July, 1886.

(normal for distant vision), 145 hyperopic, or hyperopic and astigmatic (far sighted), 13 myopic, or myopic and astigmatic (near sighted), 3 mixed astigmatism. Owing to the large per cent. (7.) of myopic eyes the authors pre-suppose another factor in its development than that engendered by sendentary habits or the use of the accomodating muscle. To prove this in a measure, the accommodation of a cat was thoroughly paralyzed by atropia, he was, however, able to make a speedy capture of a mouse with accuracy, proving the existence of very little accommodation in this animal. Among the animals examined were rabbits, guinea-pigs, mice, rats, cows, horses, cats, and dogs. From the above figures the authors think that as an optical instrument, the eye of the horse, cow, cat and rabbit, is superior to that of the rat, mouse, and guinea-pig.

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ART. VI.—BREEDING AND FEEDING.

BY A. S. HEATH, M. D.
Baldwins, Long Island, New York.

The first aim and object in the great art and science of breeding and feeding, of our domestic animals, is to secure and maintain a sound constitution, healthy and strong functions of digestion and assimilation. The next definite object should be to improve the essential powers in animals for a special purpose—either for milk, meat, butter, cheese, wool, beauty, speed, or labor—as a demanded product. Tyros in breeding and feeding, the world over, have squandered time and money in the beginning, by using too low a grade of animals to breed from. If animals as sires or dams had proven themselves as great animals were used in breeding establishments, too often their strength, stamina, and constitutions had been impaired by age, excessive use or abuse, to yield the results which might have been expected from them in a state of maturity and perfection. For the offspring inherits the sum of the qualities, characteristics, powers, aptitudes, stamina, strength, vigor, internal and external conformations and organizations peculiar to both parents. The modified combination in the offspring may be difficult at times to trace even by the best expert, yet the constituents of the compound animal is nevertheless inherent in the young. The greater prominence in the different offspring of the inherited characteristics of the same parents must depend, to a considerable degree, upon a change of condition at the times of begetting. But all things being alike, if possible, the nearer alike the compound qualities and characters of the parent must result We must not lose sight of the artificial part of the existence of the animals bred from. For, as in plant life, so in animal life there is a strong tendency to return to the natural state, as evinced by families of animals, or as apples to return to the original crab. Engrafted plants are always the same as the parent stock, while seedlings always differ. In breeding we do not engraft, but always use a compound seed to perpetuate the species.

The activity of the reproductive functions largely depend upon the healthy state of the nervous system, as well as upon the offices of nutrition and all the other animal functions hence the baneful influence of every cause that in any degree impairs the nervous energies, or weakens the functions of digestion, assimilation and vitalization. From any of these impairments in the parents, result delicacy of constitution, defect of temperament, lack of fecundity or tendency to degeneration and disease in the offspring. I might indicate pampering of the parents, too severe in-and-in breeding, exhaustion in any degree from over-work, over-feeding, underfeeding, prolonged lactation in the female, or excessive copulation in the male. It is probable that old Hambletonian, in the days of his greatest popularity, got fewer Dexters from the latter cause. George Wilkes never got remarkable stock during his severe trotting life. And though his trotting life was the severest strain ever imposed upon a sire, yet his constitution and stamina did not yield, as proven by his get after his removal to Kentucky, where he imparted his strength and speed with dams of similar powers. Scientific breeding is not a lottery.

Well kept females among cows and ewes produce more twins and hardier young than those poorly fed.

The excessive feeding of cows to produce marvelous quantities of butter in seven days, or of milk in a year, produces a fevered condition of the organs of digestion and reproduction resulting in broken down constitutions and barrenness. But where high feeding results in obesity, as in swine and shorthorns, the system may be restored to breeding health by lower diet, physic, out-door exercise, and even by working cows under the yoke, by which the fatty, plugged-up ovarian tubes permits again a free channel to the impregnation of the secluded ovaries. Pampering is a most fruitful source of barrenness in domestic animals. It produces a congestion, or inflation of the mucous membrane of the special organs of generation which both general and local treatment too often fail to relieve. These unprofitable conditions can only be ascertained by professional experts, having all the modern methods and means of diagnosis. Bulls suffer from impotency, from pampering and lack of healthful exercise or work, resulting in fatty degeneration of tissues. Impotency in young bulls is caused frequently by excessive service. A single service of the same female is better than many services at any one time of heat. Impotency or barrenness is too often inherited.

Breeding in-and-in has some marked advantages. It enables the breeder to concentrate and perpetuate superlative excellencies, even though obtained by incestuous breeding, but when too long persisted in, the constitution becomes weakened, and the size of the progeny decreases. In-and-in breeding is contrary to nature and to sound judgment and experience. In the wild state, where the indiscriminate herding together of both males and females takes place, the females generally refuse the embrace of their own males; and it is the law of herds of wild animals that the mature and stronger males serve the females. Thus, the perpetuity of the best stock is secured. Mr. Bowdy says that in his large experience in-and-in breeding will undoubtedly insure great certainty as to the product, still, when carried beyond one or two generations it is objectionable; while you secure perfect form, you run the risk of weakening the constitution of the animal you obtain. He further says that the term *in-and-in* breeding is really very indefinite, and points out that while many apply it to near relations, in reality it ought to be applied only to animals having precisely the same blood, as own sister and brother; even these have only half the blood of parents. The male has only half the blood of the dam, and the female only half of the blood of the sire, so this can scarcely be called pure in-and-in breeding, and should, even then, be practiced with thoughtful caution. The gravest and most imminent danger from in-and-in breeding comes from perpetuating defects which, when they once exist in close bred animals, concentrate blood taints that will be magnified as the rays of light passing through a double convex lens which converge the rays of light to a focus, and such breeding centers in the offspring of such couplings the same defects vastly magnified. This is a consummation devoutly to be avoided. Thol's maxim was: breed in-and-in from a bad stock and you commit ruin and devastation—but if good stock be selected you may breed in-and-in as much as you please. He certainly must have bred from a fanciful notion that delicacy and beauty of form were the ultimate wish of the breeder, for the infusion of fresh blood into a family of great excellence is a source of strength and vigor, while the closest consanguinity always tends to degeneration. One or two, or even several incestuous cohabitations of animals may not strike one as injurious when we are blinded by a degree of refinement and beauty in the offspring, but, after all, when we come to study the relative stamina, strength, and constitution of the progeny in a fair, full and unbiased manner, we shall find a surprising degree of degeneration. There may be, however, excusing circumstances, where, for instance, the nearest relations may be bred together to perpetuate a nearly extinct excellence or family. In such cases a risk may be taken rather than to forever lose a coveted quality, for the excellencies of breed is only the sum total of the excellencies of individuals; and though the breed can not be so soon injured by the maltreatment of individuals, yet it ultimately militates against the purity of the flowing stream of the breed; for each animal sends rivulets to the grand stream, and the purity of these assures the purity of the deep and steadily flowing on of the blood of the breed.

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I have purposely confined myself to some of the most important matters in breeding, lest I should occupy too much of the space of a JOURNAL so strictly scientific, and I have also purposely drawn from practical experience. I have not in any way attempted to cover the broad ground of breeding domestic animals in the space of a page or two. I trust I have been as fair as brief. By mating the third removes, or by breeding in the line of blood strains, remoter ancestors yield up blood accumulations which have been proven to possess the desired qualities. By this method the fleetest and stoutest running horses have been secured, and the fastest *trotters* bred—in this way the most satisfactory breeding has been practiced in the great establishments of the world.

Next in importance to breeding is feeding. In fact both must be practiced at the same time, as they are inseparably associated. I only give precedence to breeding as in nature the animal must exist before it can be fed. A bad animal may be usefully fed, but a bad animal cannot be profitably bred.

It is common to hurl the mutilating lance of derision at science, but any unprejudiced observer cannot fail to see the beneficent teachings and manifold workings of science in every department of human enterprise. Experience has made intelligent feeders remarkably successful in getting cows to consume enormous quantities of food; but, until very recently in butter tests, science was not importuned to reveal the secrets of perfect feeding for quantity of product. Let us glance at the process of digestion.

The process of digestion is the conversion of solid and insoluble food substances, and of food elements, into minute portions which are thus made more soluble in water or in the digestive fluids, so that these elements of nutrition may pass into the circulation and be most easily appropriated by the animal system for its own sustenance and for the manufacture of products. Until foods are changed in form by being broken up into very small portions, and made soluble by the action of the salivary, gastric, pancreatic and other glandular juices, they cannot be appropriated as food or as products. Nature has provided the means of comminution by means of the teeth and of the solution of food and product elements ordinarily required. But when animals become living machines for converting food into unusual nourishment, and into products of whatever kind of extraordinary quantities, we must resort to science to relieve animals of the extra strain upon their unaided powers for these ulterior designs. We grind coarse hard foods into particles that can be more easily acted upon by the digestive powers, and we must needs convert these ground foods into a soluble state so as to overcome the vital tax upon the animal functions, in order to secure an enormous quantity of product demanded.

The nutritious rations, chemists tell us, are made up of one proportion of protein, eight proportions of carbohydrates, and one of fat. Experiments have proven that about these relative proportions of food elements are the best for the sustenance of the animal system, and for the securing of product. This being the case, great excess of either only clogs the wheels of action of the animal functions. Too much starch, therefore, is worse than too little; too much protein, or too much fat relatively, are hindrances to the proper performance of the animal offices of digestion and assimilation. Physiologists design to convey by the term *assimilation*, the act by which living bodies appropriate and transform into their own substance, matters with which they may be placed in contact. It is the function of nutrition in man; but in our domestic animals it is more than either or both of these; it is the conversion of food elements into products—enormous products of every kind to the fullest possible extent of the animal in the briefest space of time. The age in which we live is only satisfied with the utmost possible results. Or rather, it demands that the utmost results shall be exceeded in all the animal products. The *racer* must excel his own record; the trotter annually beat his best time; the cow must yield a ton of milk, or a thousand pounds of cheese, or six hundred pounds of butter, and all the other animal products must be superlative in quality and quantity. Aid must come from science; cramming down animals the greatest amount of all manner of food and fodder, is not the physiological method of securing the best possible results in either quantity or quality of product. Stuffing is certain to result in deranged digestion which will defeat the grand aim demanded. When breeders and feeders learn that excess of the starch in the ration decreases the digestibility of all other kinds of the fodder elements, they will the better and more certainly secure large amounts of special products. We can no more secure butter from starch, or from fat, or from proteids separately and alone, than we can fatten animals alone on water, though water is an essential property in fattening animals. The excrements of animals over-fed on starchy foods, will show undigested starch, by the aid of the microscope, or by the iodine test. It is this wasteful kind of feeding that detracts from the receipts from the dairy, the farm, and from nearly all of the products of domestic animals; and especially is there a great waste of feed in old horses and hard worked city horses. Could the amount of waste in dollars be estimated in the United States it would show a fearful prodigality that would be astonishing, for it would reach millions annually. W. Mathieu Williams aptly says: "Man alters the position of physical things in such-wise, that the forces of nature shall operate upon them, and produce the changes or other results that he requires." This is said of the man who has become conversant with the laws of nature, and not of him who plunges in without thought, reflection or knowledge. It might justly be said of the average farmer that he is the most wasteful of all men, for from his abundance he saves so little.

The following table contains a summary of the results of experiments by Henneberg & Strohmann, E. Schulze & Moreker, Strohmann & Wolff, compiled from Wolff. The first column contains the name of the experimenter; the second, the amount of starch fed, expressed in per cent. of the dry matter of the remaining fodder; the third shows the character of the other fodder; the fourth and fifth express the decrease in the digestibility of the protein and crude fiber in per cent. of the quantity of each which was digested when the starch was withheld. The above and the tables I quote from the valuable compilation of Armsby. And I specially request a careful study of the tables, in order that we may fully ascertain the astonishing facts which form the foundation of the physiological principles of rational feeding. It is also a settled fact that excess of starch or sugar diminishes the digestibility of portein and fiber, indicating clearly the necessity of observing and respecting a medium nutritive ratio in feeding animals for whatsoever products.

No.	AUTHORITY.	STARCH IN PER CENT. OF OTHER FODDER.	FODDER EXCLUSIVE OF STARCH.	DECREASE INDIGESTION OF	
				PROTEIN PER CENT.	CRUDE FIBER PER CENT.
1	Henneberg and Strohmann......	15	Clover hay, straw, and beans.	7	6
2	....	18	....	11	7
3	Henneberg and Strohmann	29	....	21	15
4	Henneberg and Strohmann	9	....	3	4
5	Henneberg and Strohmann......	9	Same with more beans	4	2
6	Schulze and Morecker...............	25	Hay..	41	10
7	Schulze and Morecker...............	25	Hay and beans.....................	20	13
8	Strohmann...........	15	Hay	12	12
9	Strohmann............	69	Hay	44	7
10	Strohmann............	15	Hay and oil cake	9	10
11	Wolff(experiments on hays)..........	15	Barley......................................	0	....
12	Wolff(experiments on hays)..........	31	Barley	11	....

Two things are shown by this table. First, the greater the amount of starch which is added to a ration, the more is the digestibility of the protein and crude fiber decreased, e. g. in experiments, 1, 2 and 3, or 8 and 9; second, the richer the original ration in protein, the less is the depression caused by a given quantity of starch, e. g. experiments 6 and 7.

Strohmann's formula is here given, and though it is from inductions, and dependent upon a large number, doubtless, of accurate observations, yet these formulas are not based upon a mathematical certainty, but still possess much value.

" $P' = \frac{P}{1 + \frac{1}{8} P} S$. In which P' represents the digestible protein, P the total crude protein, and S the total non-nitrogenous matters of the ration, including fat."

I quote the following from Armsby:

" Indeed a too wide nutritive ratio may cause more waste than a too narrow one. In the former case the protein consumption is * * * needlessly increased, but the nitrogen of this protein is excreted in the urine, and has its value in the manure. In the second case, a too-wide nutritive ratio also causes a waste of protein by decreasing its digestibility, but it also causes some of the starch to pass through the body without being put to any use, while as manure the latter is absolutely valueless, containing only elements of which the atmosphere offers an inexhaustable supply to plants." Animals throw off carbonic acid, while growing plants absorb it through their myriad mouths located in every leaf.

I find so much that is significant and pertinent to the subject under consideration in Dr. G. C. Caldwell's article to the New York *Weekly Tribune*, entitled *Protein Rich Food For Pigs*—*Three Strong Reasons for its Use*, that I would quote it entire, had I the space, but must be content with the briefest possible statement of conclusions in it. He says: "Professor J. W. Sanborn reports that *feed rich in protein makes more lean meat and less fat: that,* 100 *lbs. of ship-stuff will go as far as* 108 *lbs. of corn meal in respect to economy in production of increase in weight; and that feed richer in protein makes richer manure."* The above was in reference to feeding pigs, but applies equally well in the feeding of other animals.

Cooking food at a low temperature is quite inexpensive, and like grinding, but still better, it predigests the elements of foods so as to relieve the unnecessarily taxed functions of feeding animals, as well as those who perform fast or severe work. Malt also possesses large proportions of the *amines, amides,* and *amids-acids,* which predigest the starchy elements of foods. These have a close chemical resemblance to ammonia which plays so prominent a part in the animal and vegetable world. Malting of the grains not only enrich the poorer fodders by adding albuminoids, and in promoting the conversion of starchy foods into soluble and thus readily digestible substances, but they also promote and stimulate the digestibility of all foods and fodders. It is by the use of rich proteids possessing these delicate and potent qualities that enormous products in milk, butter, cheese, meat, or labor are procurable by scientific feeding without the risk of injury to the animals fed. Let us look at one single instance of the potentiality of these *amids-acids* and nitrogenous organic substances upon the possibilities of feeding for products. To a thick pudding of oatmeal porridge heated to a temperature of 150° Fah., stir in one-sixth quantity of perfectly dry *malt flour*, and a marvelous change soon takes place. Instead of becoming dryer and harder, it acts in consistency like adding water, it converts the thick pudding into a thin, sweet, and easily digested porridge. This results from the powerful action of the *diastase of malt.*

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ART. VII.—LUNG WORMS IN SHEEP.

BY N. S. TOWNSEND, M. D.
Professor of Agriculture, State University, Columbus, Ohio.

My object in sending to you a short paper upon lung worms in sheep is not so much to state what is known as to suggest enquiry in regard to what perhaps is not known. In Ohio about five millions of sheep are usually kept; and next to dogs by far their worst enemy is the lung worm, *Strongylus filaria.* From this cause hundreds of thousands of sheep have died in Ohio in a single season, while scarcely a year passes without the loss of many thousands. The disease occasioned by these parasites is known among farmers here as paper skin, white skin, pelt rot, &c., and among veterinarians as verminous bronchitis, parasitic anæmia, &c.

The early stages of the disease are characterized by fits of coughing and sneezing, with discharge of mucous from the nostrils. The affected sheep stretches the neck, rubs the nose upon the grass, and gives other evidence of difficult breathing, or irritation of the air passages. After a time the animal loses flesh and strength, the eyes and mucous membranes become unusally pale, a diarrhœa comes on and rapidly hastens the general emaciation. The wool becomes loose, and is easily pulled off, or comes off spontaneously in patches, leaving the skin peculiarly bloodless and pale, and hence the popular names, white skin, paper skin, &c. Finally the sheep dies from exhaustion, except in a few cases where in the earlier stages of the disease the smaller bronchial tubes are literally filled with the worms, and the sheep dies of suffocation. Of the Strongylus filaria, it is easy to distinguish the sex, the females being white, and sometimes as much as four inches in length; the males are shorter, and slightly yellow in color; lambs during their first year are most subject to this disease though older sheep are not exempt.

Treatment is usually both dietetic and medicinal; when sheep are fed a liberal allowance of oats or oil cake their powers of resistance to the disease are greatly increased; medical treatment consist of fumigations with sulphur, tar vapor, or chlorine gas; the most effectual probably being the sulphur. The sheep are driven into a close stable, a pan of burning coals is carried in, then the doors and other openings are closed, and either roll brimstone or flowers of sulphur is thrown upon the fire until the fumes of sulphurous acid gas fill the place. The operator should submit to the fumigation with the sheep so that he may be able to judge when they can bear it no longer. Ten or fifteen minutes at a time, and repeated once or twice after intervals of a week, may be sufficient. After fumigation a tablespoonful or thereabouts of a mixture of castor oil and spirits of turpentine, in the proportion of three of the former to one of the latter, should be given to each sheep daily for a few times. When on examination of sheep that have died the worms are found exclusively in the lungs, whisky, linseed oil, or milk may be substituted for the castor oil, and in the same proportion. If in addition to worms in the lungs, the Strongylus rufescens or S. contortus are found in the third or fourth stomach or intestines, the castor oil with the turpentine is preferable. This treatment if skillfully managed is tolerably successful; in April last a farmer in an adjoining county, after fumigating a lot of very sick sheep with sulphur, then gave the castor oil and turpentine; the sheep immediately improved with the exception of one which had become too weak, so that after the fumigation and two doses of the turpentine mixture it died and was sent to the writer for examination. The body of the sheep was found to be completely anæmic, the lungs had considerably more than their natural density, the result of inflammatory exudation;

but after the most diligent search, not a single worm could be found in any of the bronchial ramifications, while in the nostrils, and attached to the teeth were several dead worms, the last that had been coughed up before the sheep had ceased to breathe.

But inasmuch as prevention is better than cure, a complete life history of the parasite is greatly needed, so that it may be avoided or destroyed before its mischief is done. Cobbold* says "the question which agriculturists should be chiefly desirous of solving is that appertaining to the mode of origination and development of these parasites, for by acquiring accurate data on this head, it is not altogether unreasonable to suppose that we may hit upon a more or less perfect method of limiting or eradicating the disastrous epizootics associated with an excessive multiplication of these creatures during particular seasons." Van Beneden† says of nematode or threadlike worms, "that about a thousand varieties are known, varying in length from a few millimeters to forty or fifty centimeters. They are not all parasitic, since some are found in the sea, and others in damp earth, in putrid matter, and even upon plants. The migrations of nematodes are subjects of great interest; their changes of form are not usually very considerable, but the modifications in their sexual apparatus, whether in the same individual or in succeeding generations, are very curious. When we consider the numerous encysted, and agamous nematodes which are found in the different orders of mammalia, birds, reptiles, batrachians, and fishes, there is little doubt that all these beings are only migratory parasites which pass together with their hosts into the animals to which they are destined. They are found, like ascarides, in animals of all classes; some are to be met with in all the organs, the brain, the eye, the muscles, the heart, the lungs, the tracheal artery, the frontal sinus, the digestive tube, the skin, and even in the blood. Sometimes the two sexes live under the same conditions, sometimes the male is dependent on its female, or else one generation is parasitic and the next is independent. There is great diversity with respect to development; some nematodes like trichinæ are developed so rapidly that the embryo is already perfect in the egg before it has quitted its mother; others like the Ascaris lumbricoides lay eggs in which the embryos do not appear for several weeks or even months after they have been laid. Between these two extremes we find all the intermediate degrees." That Strongylus filaria is able to maintain an independent life in damp earth for a time is no longer a question. Professor Ercolani obtained these parasites from the lungs of a goat, kept them alive in damp earth, saw them reproduce, and was able to obtain several generations of them. But that they have other than mammalian host is equally certain, and that these may have much to do with their occasional superabundance is more than probable. Orthopterous and Coleopterous insects, are often found infested with gordii; common mollusks, such as Limax agrestis, harbor the Distoma hepaticum or liver fluke; and there is reason to suspect that various aquatic mollusks such as Limnæus and Physæ or Planorbis, &c., may be hosts of strongyli, as fish are well known to be. Should these nematodes be abundantly found in our fresh water mollusks or their embryos found in running water, it might explain the special danger to which sheep are exposed by pasturing on meadows which have been subject to overflow. In Europe as many as eight or nine species of strongyli infesting different animals are known; in this country, it is not unusual to find three species in the lungs or intestinal canal of the same sheep.

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*Internal Parasites of the Domestic Animals.

†Animal Parasites and Messmates.

If zoology were a more popular study among farmers, or if veterinarians would more frequently give special attention to the entozoon of our domestic animals, is it not probable that in localities where lung worm disease is prevalent, important discoveries in regard to the life history of the parasite might be made, and its ravages in future measurably prevented?

Art. VIII.—"BARSATI," OR ATROPHIC CARCINOMA.

BY RICHARD W. BURKE, V. S., A. D. V.
Cawnpore, India.

(Continued from page 376, Vol. VII.)

Many observers agree in stating that Barsati sores are very liable to be immediately developed in the seats of abrasions, and that small sores take on in India a fungous or ulcerative character like Barsati sores. Mr. Hart speaks of this as occurring commonly during the rains in connection with the wounds and galls of the horse. Armstrong notices the same thing. And we have only recently recorded several similar instances—which would not show a parasitic origin in respect of this disease. There can be little question that disorder of the general nutrition induced by climate is one element in the production of Barsati and its allies. The parts attacked are those most exposed to injuries or irritation: *example,* angles of the mouth, the lachrymal region. the prepuce, inner aspect of the fetlocks, &c. And we are not without analogical evidence of similar disease being induced in like manner in other species, and in some other countries. French medical literature abounds in instances of such tissue changes being the results of climatic influences. In the West Indies, in China, and in some other countries, it has been observed that sores take on not a suppurative or ulcerative action, though they do this sometime, but frequently are succeeded by an hypertrophous growth of the fibrous tissue as the result of such influences. It is clearly shown by these results, therefore, that the causes which have been supposed to engender them are not such as can, in any intelligible way, favor the introduction of germs from without the body. Thus, in this disease, the continued irritation of tears over the lachrymal surface, or of secretions within the prepuce, or of the bit against the angles of the mouth of the horse, has been observed to be followed by the occurrence of Barsati in these parts in such a number of cases as to justify the inference that it has been the starting point of the disease. Such growths arise, then, from a peculiar perversion of the normal nutritive process, allied to those modifications which we have been induced to suppose are the causes of the more peculiar kinds of common growths; but in the case of malignant growths, the perversion is much greater in degree, and shows itself not only in its origin, but in its whole subsequent history. The irritations connected with the bit at the angles of the mouth, with the secretions in the prepuce, and the habit of "brushing" at the fetlocks, &c., may induce this extraordinary alteration in the molecular nutrition of these parts, leading to the disease under consideration. We have had several times the opportunity of examining portions of skin affected with Barsati in the earliest stages, and the anatomical changes present in them have been uniform and simple. There is an area of increased vascularity, over which a dense infiltration with small cells is seen, placed just beneath the epithelium. The latter is thickened and piled up in disorderly fashion. The cells of the rete are undergoing rapid multiplication, the lower layers being crowded, and in places heaped up in masses or little *balls* which, often attaining to a large size readily visible to the naked eye, undergo calcareous deposition, and acquire a hardness which has likened them to the stone known in India under the name *kunkur*. Thus the whole process of normal formation of the skin is at a disturbance. Whether the excitant which causes the disturbance is engendered by chronic irritation of the part, or whether it is only rendered locally active by it under certain constitutional * conditions are questions which remain at present unsolved in pathology. But the degree of evolution to which a new formation may attain, must plainly depend, to a large extent upon the nature of the excitement. The more it resembles the normal stimulus to growth and development, the more perfect and limited will be the development of the new growth; and the more intense the excitant, the more embryonic and unlimited the growth.

Those who are contending for a proof of the parasitic theory of this disease, seem to be driven to the choice of one alternative—Is it, or is it not communicable? Mr. Smith alone has succeeded,* after experiencing many failures,† in inoculating Barsati from one animal the subject of it to another that was not. And if we review the general experience in regard to experiments in this direction concerning both cancer of man and Barsati as it occurs in the horse, we find that the results of such experience differ in respect of neither. An experiment of Professor Langenbeck was supposed to have proved that the cancerous pulp containing the cancer cells is capable of propagating cancer in man and animals on being injected into the veins, but the attempt has been frequently made by others without any result. So in regard to Barsati; excepting the above instance, all other experiments by other Veterinary Surgeons have uniformly failed to produce the disease, although enough experiments have now been made in this direction.

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* The significance of desquamation following the administration or use of certain drugs, such as turpentine, perhaps capaiba, &c., may have a good deal to teach yet about the law under which cell changes take place locally, as a result of constitutional causes.

The fact that the disease can be induced by ineculation, moreover, does not prove that the cause of the disease is derived from without the body, since the very cells of the body themselves, as changed in disease, can be transplanted from body to body and induce furunculoid and ulcerative mischief; in other words, there is nothing in the aspect of the disease itself, nor in the facts of the inoculated disease, to show that its cause is very likely to be parasitic. A direct transmission of Barsati has been proved impossible; and it by no means follows that one or two exceptional successes which are recorded were entirely due to the inoculations, and were not developed in the ordinary course of things, seeing that simple wounds in India so often terminate in Barsati. I do not wish to say anything in discouragement of experiments, seeing that I have probably tried inoculations on as many animals myself; but individual results should include general results. It is also probable that constitutional predisposition, as from previous attacks of disease, when present, may favor the success of an inoculation. We must at present explain differently the connection between such successes and the causation of the disease under consideration. We, at any rate, know that the

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*Veterinary Journal, 1884.
†Ibid, 1879, 1881.

accumulated experience of the veterinarians of thirty odd years shows that experiment in this direction is by no means isolated but is one of a series, many of which have been published in the pages of our professional journals. We may study Mr. Smith's success from two points of view, as showing the influence of constitutional tendency upon local disease processes, and the influence of local irritation upon general constitutional states. It is known that in a very large number of cases where simple wounds been seen to be followed by Barsati sores, the, constitution of the animal was at fault, as shown by the history of many cases. Although the actually demonstrable lesions of this disease appear to travel from local to systemic centers, there is yet every reasonable probability that constitutional tendency, especially if favored by climatic causes, may be the starting point of genuine Barsati. The local manifestations may be regarded as expressions of a general dyscrasia; and an animal which from an injury or irritation gets indubitable Barsati may be held to be predisposed from causes latent in the system, which may appear healthy or even produce such results on the body as may be designated for the time "robust."

Thus far we have justified the contention, I think, that the disease originates by means of primary changes in the skin of necrotic character; and although the "fungus" theory has long been in high favor with some writers, there is an abundance of valuable and fruitful work to be done before these questions can be definitely settled, the disease having, at one time or another, been mistaken for most, if not all, of the chronic ulcers and sores of India, including Delhi-Boil, Keloid, Rodent Ulcer and Ichthyosis of the horse. We have no idea how common it is, at first sight, to mistake any of the above mentioned diseases for Barsati, and how necessary it is, in dealing with any disease, to recognize and watch the clinical differences that are presented. The secondary changes in internal organs we have recorded in many cases of long-standing Barsati are due to proliferation and malnutrition of the parts concerned, and necrotic changes locally taking place, owing to the discharge of necrotic tissue into the circulation. This *metastasis* never manifests itself early in the course of the disease, but shows itself only after a long interval, as proved by numerous autopsies we have now made.

Many observers exalt special remedies in the treatment of Barsati, and, as usual, each produces a list of cures in favor of his favorite application. Further evidence of the difficulty of settling this point is afforded by general experience, which disproves the utility of these cures, and shows that their benefits have been over-estimated. The results of treatment, therefore, still further assimilate it with the cancer of man.

Not a few cases of Barsati become, after a shorter or longer time, arrested and retrogressive, and, ultimately, to all appearances, cured. These apparent cures are not always permanent, but after intervals of six months, a year, or more, a similar affection is started again, either in the same or in another part, or in both, when it contaminates the internal organs, or becomes again *atrophic* and is arrested, another striking resemblance between it and the form of human cancer known on the continent of Europe under the name *Atrophic Carcinoma.* Some pathologists call this *Recurrent* Fibroid*, a vague term applied to many different species. For a tumor to be called fibroid it is not enough that it should contain fibrous tissue; it must also contain no other tissue. A fibrous matrix is common to nearly all tumors; and Barsati has a fibrous stroma which predominates in many parts of its structure, but it always contains in its mesh-work cells; whereas true fibroids are composed solely of fibrous tissue. Moreover, although the distinctions of the various forms of cancer are useful and wise, and practical, and founded on natural laws, still there are cases in which these different forms pass into each other, and in which all these peculiarities may be seen affecting the same patient. "These cases of combination" says a recent writer on cancer, "are sufficiently rare to make the distinctions valuable in practice, but they at the same time show the common character of all these forms of disease." Various other names have been given to this form of cancer, as for example, *contracting cancer, cicatrical cancer, &c.*, each of which indicates some prominent feature of the disease. The cells, in this form of the disease, appear to be very short-lived, for they are scarcely formed before they commence to decay

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* The term "recurrent" here is misleading, inasmuch as all malignant growths are recurrent.

(*Billroth*); but peripherally the slight cell-infiltration constantly extends; hence complete disappearance of the disease very rarely, if ever, takes place. Some surgeons even object to the term cancer being applied to epithelioma, but this objection is not valid, being founded on mere physical differences of no importance.

Mr. Hart writes—"After an *indefinite* period of immunity the disease (Barsati) reappears." We know the history of several cases in which the disease recurred after a cessation of three years, and in one case, recently treated, after a period of four years, whilst Hutchinson, Professors Billroth, Buchanan, and Dr. Whitehead give instances of immunity after operation and other modes of treatment for cancer, extending to three, five, nine, and fifteen years in the case of man.* The tendency to fibroid development in excess of cell formation is one of the most potent agencies in giving respite, and, in some cases, towards arrest and apparent care of the disease.

The original starting-point of cancer is a question on which opinions are extremely various. Virchow says, the disease commences in the connective tissue of the skin: Thiersch contends that it originates in the sebaceous glands in conjunction with projections of the rete into the cutis; while Koster argues that the disease begins in neither of these ways, but by a change in the endothelium of the vessels alone and without participation of the connective tissue. Koster's view is favored by Billroth, who thinks that the principal seat of the activity of cancer is the endothelium of the lymphatics of the skin. Rindfleisch inclines to the view of Thiersch. Thus we see that the precise origin of cancer, so far as is at present determined, amounts to conflicting theories. If any other tissue were present, no doubt some one would advance it as the origin of the disease. There is little doubt but that all the tissues are more or less affected, and in our diagnosis of this disease we must not go by the changes presented by any one particular structure of the skin, but by the changes presented by all the structures taken collectively, and these considered in reference to the clinical aspects of the disease.

The above extract of opinions shows the obscurity of the

*(Lancet, October 29, 1881).

question and the consequent general uncertainty and conflicting opinions that prevail respecting the origin of cancer, and offer, perhaps, the best apology I can allege for intruding my opinions and conclusions as to the actual causes of Barsati in the horse.

(To be Continued.)

EDITORIAL DEPARTMENT.

Conventions in Chicago.—National Veterinary and Sanitary Association of the United States. National Cattle Growers' Association.

The third week of October was marked by the meeting of these two associations in Chicago and great good should be the result of them.

THE NATIONAL VETERINARY AND SANITARY ASSOCIATION

Met on October 15th, and continued its sessions for three days. But little time was used in adopting a simple constitution, and effecting a permament organization.

After a short address by the president, in which he outlined the object of the meeting, the association went at once energetically to work on the most important question of the moment, Contagious Pleuro-pneumonia.

Letters relating to the subject and regretting absence, from Prof. A. Liautard, of New York, Prof. C. A. Lyman, of Boston, Dr. Holcombe, State Veterinarian of Kansas, and others, were read.

Dr. Gadsden, Dr. Salmon, and a number of other gentlemen who had been inspecting the cattle stables of Chicago, read papers or made addresses defining the exact status of the extensive outbreak of the lung plague in the neighborhood, and expressed their views in regard to the means to be employed for its suppression. Dr. Gadsden showed some specimens of diseased lungs, which he had removed the day before, from cattle in the Chicago stables. All discussion of papers was to the point; there was but little dissention among the professional members, while the lay members of the association only asked for definite information, and for the reasons of the danger, which they appreciated was threatening their herds. The following resolutions were adopted:

WHEREAS, The existence of contagious diseases among animals in the United States is annually a source of great loss; and

WHEREAS, The great cattle industry, commerce and food supply of the country are particularly threatened by the recent extensions of contagious pleuro-pneumonia; and

WHEREAS, Real and alleged outbreaks of contagious disease require constant investigation and control; therefore, be it

Resolved, The veterinarians and veterinary sanitary boards of the United States in convention assembled recognize the wisdom of Congress in establishing the Bureau of Animal Industry, and, while heartily appreciating the valuable services rendered by this bureau in the past, we would recommend such additional legislation as to enable it to effectually extirpate contagious pleuro-pneumonia, and to control such other contagious diseases as may from time to time appear; and

WHEREAS, Contagious pleuro-pneumonia of cattle exists in certain restricted localities of the United States; and

WHEREAS, Inoculation is being practiced in certain States as a preventive measure, and is being advocated for general adoption; and

WHEREAS, The experience of other nations has shown that this contagion is prevalent in localities where inoculation is practiced, and that inoculated cattle are dangerous to other animals with which they afterwards cohabit; and

WHEREAS, The veterinary profession of Europe condemns inoculation, except in localities that are thoroughly infected and where no effort is being made to extirpate the plague; therefore, be it

Resolved, That considering the limited territory infected in this country, every effort should be directed to the thorough eradication of this disease from America.

Resolved, That we consider inoculation to be an extremely dangerous and objectionable practice in the present condition of affairs in this country, and one which should be discouraged by the veterinary profession and prohibited by law as long as there is a possibility of stamping out the disease.

The association was unanimous in its expression, that extirpation, the pole-axe, is the only reasonable treatment and method of handling this disease, whatever the cost.

While the attendance at the meetings was smaller than had been hoped for, it was representative of the West, but two or three of the state and territorial veterinarians being absent, and those who were present were supported by members of their live stock commissions. The East was unfortunately but poorly represented in numbers.

The usefulness of the Bureau of Animal Industry, even with its crippled means, was happily demonstrated by the presence of Dr. Salmon, with two or three of his assistants, who were able to furnish any desired information, in regard to infected districts and the veterinary force in charge of such regions, notwithstanding the absence of the local delegates.

The following officers were chosen for the ensuing year, and the place and time of the next meeting was fixed, at the call of the President, to coincide with that of the National Cattle Growers' Association: The Hon. J. L. Brush, Greeley, Colo., President; Dr. J. D. Hopkins, Cheyenne, Wyoming, and Dr. V. T. Atkinson, Wisconsin, Vice-Presidents; Dr. Paul Paquin, Columbia, Missouri, Secretary.

THE NATIONAL CATTLE GROWERS' ASSOCIATION

Met on October 16th, 1886, in the call room of the Board of Trade, the Hon. D. W. Smith, presiding. This meeting composed of several hundred delegates, who practically represented all the great cattle wealth of the country, the ranch owners of the West, the Shorthorn, Holstein-Friesian, Angus, Jersey, etc., etc., cattle associations, and veterinarians holding official positions or interested in the public weal, was like the preceding meeting, prompt and energetic in its discussions, conclusions and actions.

A year ago the National Cattle Growers' Association had appreciated the necessity of some legislation in regard to contagious diseases, and the more far-seeing members, guided by the energy of the president, Mr. Smith, went to Washington and attempted the passage of a bill, which failed. The recent arrival of the wolf at the very doorstep of the West wakened up every cattle delegate who was present; the lung plague took precedence of every other subject. The resolutions offered by the veterinarians were listened to with attention. Dr. Gadsden, M.R.C.V.S., read two short papers on contagious pleuro-pneumonia. The enthusiasm even reached the proprietors of the Chicago stock yards, and an honest address was presented by Mr. Washburn, the superintendent, who unfortunately, however, supposed that contagious diseases were like a dead whale washed up on a strand, a public nuisance, to be carted away at a certain expense and the carters discharged. He complained of the cost of a bureau (of animal industry) and proposed in its stead a "commission" to be appointed to deal with diseases—presumably a new commission with each outbreak, if not, certainly the permanent "commission" was practically to become a new "bureau." The resolutions presented by the veterinary association were adopted. An error almost occurred in the re-wording of the resolution, in regard to preventive inoculation. The first wording was made to read:

Resolved, "That any National legislation for the extirpation "of diseases should prohibit, with appropriate penalties, inocu-"lation with the virus of any contagious diseases incident to "animals,"

But was altered to "Inoculation with the virus of contagious "pleuro-pneumonia."

The following resolution was adopted and a prompt means of furnishing the necessary funds needed for procuring legislation was furnished by a voluntary assessment on the various cattle associations.

Whereas, It has been fully demonstrated to this convention by the testimony of professional veterinarians of the highest ability and experience that contagious pleuro-pneumonia exists in an active form among certain cattle in the city of Chicago; and

Whereas, From the fatal character of this terrible disease and the difficulty of extirpating it, the existence of it near the greatest cattle market of the United States constitutes a danger to the chief food supply of the country; and

Whereas, The further progress of this disease by causing other States to prohibit the introduction of cattle from this

State threatens an entire interruption of inter-State commerce in this vitally important article of trade, and will result in losses of a magnitude that can not be expressed in figures; and

Whereas, It is the belief of this convention that a disease so dangerous, and whose consequences would be so disastrous and far-reaching, can not be adequately met and controlled by local authorities acting under state legislation; therefore, be it

Resolved, That this convention holds it to be the duty of the national government to undertake the suppression of this disease; that this should be done immediately, in the most thorough and complete manner, and without regard to cost, and that Congress should, at its approaching session, and without a day of unnecessary delay, provide by law appropriate machinery and ample funds for this purpose; and

Resolved, further, That a committee of five be appointed by the chair, to be known as the committee on legislation, whose duty it shall be to go to Washington the coming winter and endeavor to obtain the passage of such laws as will accomplish the above end.

Resolved, That it is the duty of federal, state and municipal authorities to unite in an effort to extirpate pleuro-pneumonia, wherever it may be found, by destroying diseased cattle, and those having been exposed to disease, so far as possible, purifying all premises in which the disease has existed, and adopting stringent sanitary regulations with regard to the management of cattle in the feeding stations.

This association represents a vast interest at stake, realizes the loss which any further delay in proper legislation entails, and is so thoroughly in earnest, that we may hope for a bill to pass early in the present session of Congress. An important question is what will be the form of the bill? Any satisfactory legislation must provide for a large expenditure of money and settle the question of "States rights."

If this be placed liberally in the hands of the Bureau of Animal Industry, we believe the end will be accomplished. It is sincerely to be hoped that no attempt will be made to form a new commission, to change horses in the middle of the stream, when action must be prompt, when every moment represents one more infecting animal in the country. Our readers are the expert authorities, who have a right, by their education, to guide such legislation as this; and every one should see his representative at Washington, and explain and convince him of the necessity of a liberal bill, not confined to the lung-plague, but looking to the future, controlling all other contagious diseases of our domestic animals. H.

BACK NUMBERS WANTED.—We will exchange any number of Vol. VII, (1886), or advance subscription one issue for every copy of the following numbers of this journal, viz.:—Vol. I, Nos. 3 and 4 (July and Oct., 1880); Vol. VI, Nos. 2 and 3 (April and July, 1885).

Please send such copies to the publisher, 1217 Filbert St., Philadelphia, Pa., who will acknowledge their receipt.

SEMI-ANNUAL MEETING OF THE UNITED STATES VETERINARY MEDICAL ASSOCIATION. This meeting will be held in Philadelphia, on Tuesday March 15th, 1887. We hope that there will be a full attendance, to furnish, for our next issuse, the interesting material which should emanate from the convention of such a society. Many of the older members know Philadelphia only in a social aspect, we trust that both they, and the newer members of the profession will honor their colleagues of Pennsylvania by their presence.

CASE DEPARTMENT.

AUTOPSIES AT CENTRAL PARK MENAGERIE.

SPOTTED HYENA—*Hyæna Orocuta, Hab.* South Africa, died November 23d, 1886. It had fed nearly as well as usual, on the day of its death, but had moved about the cage as if cramped up in its abdomen during the last few days.

On opening the thoracic and abdominal cavities, an enormous sac was observed, crowding up the diaphragm and almost completely filling the abdomen. It extended to the *symphysis pubis*, contained fully two gallons, and measured over eighteen inches in the sagittal direction, and extended from the right to the left false ribs in the transverse diameter. This enormous sac was the stomach. Closer examination revealed the existence of a *duodenal stricture.* The seat of the stricture showed the usual characters of the intestinal tunic, except at one point, where a mass of almost cartilaginous hardness was found, which consisted of fibrillar connective tissue. The pyloric orifice had been greatly distended, obliterating the valve. A conical passage led to the site of the stricture, gradually narrowing down to the size of a crow quill before reaching the latter. The stricture admitted a bristle with difficulty, and did not permit fluid to pass through without considerable pressure. It was slightly twisted, the twist being evidently due to the distorting influence of the expanding stomach.

The intestinal canal was remarkably atrophied, and crowded into the pelvic cavity; it could have been held in the hollow of one hand. Its diameter was in few places more than one centimeter. The texture was normal, though slightly atrophic, and the color intensely green, owing to the fact that the contents were exclusively bile, which had an uninterrupted flow into the intestinal canal immediately below the stricture.

The stomach had an enormously hypertrophied mucosa. The ridges and folds were greatly magnified, forming a sort of reticulum. In the meshes of this reticulum the muscular coat was in part atrophic. There were some slight hemorrhages into the mucus covering the folds, but neither ulceration nor signs of true inflammation could be discovered. The contents of the stomach were meat evidently eaten before death, bones, softened to gristle-like masses, some of them several inches in diameter, and *stercoraceous* material of a dark tea-leaf color. As a regurgitation of bile was impossible. this is an interesting observation.

The heart was in a flaccid condition, though like the lungs, kidneys, central nervous system, etc., it was texturally remarkably healthy, as indeed the animal was, aside from the gastric dilatation and stricture, one of the healthiest we have seen.

Anatomical Diagnosis: Stricture of the duodenum, gradual occlusion at the seat of stricture, secondary dilatation of stomach, torsion ensuing in consequence and complete closure. The probable cause of death was reflex paralysis of the heart. E. C. S.

HORSE DISEASE AT COONONG.—Mr. Edward Stanley, F.R.C.V.S., has forwarded to the Chief Inspector of Stock a report on the outbreak of disease among horses feeding on ensilage. The symptoms were in all cases alike, varying only in degree. They were listlessness, prostration of strength, sore throat (without swelling or pain upon manipulation). Irritation was shown by liquids being swallowed with great difficulty, although thirst was marked. Food and water were both returned through the nostrils, this often being accompanied by fits of coughing. The bowels were constipated, with straining; the dung was dark-colored and most offensive. The urine was passed freely, and in large quantities; it was of the usual color and clear. It presented nothing diagnostic on examination. The pulse was small, hard, feeble, and indistinct. The heart was irritable and labored, ranging from 40 to 60 beats per minute. Respiration was slightly accelerated; but with feeble chest and abdominal movements, visible mucous membranes were of a dirty, brownish-yellowish color. The tongue was pasty and dry, emitting a horrid, nauseating odor, almost unbearable. The temperature ranged from 95 to 100 degrees. The extremities were cold. The *post-mortem* appearances were as follows: Congestion of the nasal passages, larynx, and trachèa. The tongues were dry and thickly furred. The pharynx was inflamed, but free from ulceration or diptheritic deposit. The stomachs and large intestines were of a brownish-black color, the mucous membrane being deeply stained. Contents of the rectum, hard and dry. The peritoneum was stained in large patches of a ruddy color, and the mesenteric veins were filled with black, coagulated blood. The bladders were ecchymosed in a most remarkable manner. Heart was flabby, dark in color. Extravasations of blood occurred along the blood-vessels, and also on the fleshy pillars inside the ventricles. Both right and left cavities contained firm clots of blood, separated by gravitation. Liver was dark and slightly ecchymosed. Spleen healthy in appearance. Lungs, in one case, were full of congested blood, and the treachæ and bronchial tubes were greenish black in color. The unfortunate fatality led Mr. Stanley to the conclusion that ensilage exposed to the air for a very few days under favorable climatic conditions, such as moisture and temperature heat, forms an excellent seed-bed and nourishing medium for fungoid growths, such as moulds and low forms of vegetable life. Their germs being always present in the air, are increased to myriads under favorable conditions, and such undoubtedly existed in this outbreak. Rain having recently fallen, following a long period of heat and drought, and the horses being weak, predisposed them to the ill effects of the fungus, which not only entered their systems through the stomach, but also during respiration. Being exposed to the same poisonous agents day after day, chronic poisoning and fatal consequences followed. W. A. C.

CEREBRO-SPINAL MENINGITIS OF CATTLE.—At the last congress of German Naturalists and Physicians, held at Berlin, Dr. Schmidt, of Aix-la-Chapelle, described the hitherto imperfectly recognized disease of cattle known as cerebro-spinal meningitis. There is no change of temperature, pulse, or respiration but during the stage of excitation, during which the animals are restless and throw the head from side to side, but are unable to flex or extend it. This is followed by a stage of depression; there is a tonic spasm of the muscles of the neck; there may be trismus, and the animal, although not stupefied, is very lethargic. The skin becomes cool, the general temperature sinks to 38 degrees C, and regularly, from the second day on, there are spasms of the longissimus dorsi, clonic, recurring about twenty times a minute. Spasms in other muscles, such as the serratus and those of the eye-lids, sometimes occur, and gradually increase in intensity. Occasionally the fore-leg is paralyzed. Only one patient recovered, and this one had the muscular spasms four weeks. All other cases terminated fatally, in from six to eight days. On the autopsy, in early cases, hyperæmia of the brain membranes was found; in those killed on the second to fourth day, a clear fluid was found in the meshes of the pia; and in later ones, a gelatinous material, particularly in the sulci of the cerebrum. The ventricles, as well as the tissue proper of the brain and cord, appeared normal. E. C. S.

STATISTICS OF HOSPITAL AND OUT-PATIENT SERVICE.

VETERINARY DEPARTMENT. UNIVERSITY OF PENNSYLVANIA,

Sept. 1st, 1885, to Sept. 1st, 1886.

	Hospital.	Out Patient.
Abscess	2	1
Amputation. Legs dog	2	
" Tail dog		1
" Rudimentary penis. Horse		1
Anæmia		4
Anasarea	2	
Arthritis	3	
Atrophy. Muscular		2
Broken knee	1	
Bronchitis	1	6
" Chronic		1
Bruised feet	2	
" heel		2
Burnt sole	1	4
Bursa	1	2
Caries. Superior Maxillary		2
Castration	3	
Cataract		2
Catarrh. Auricular	3	6
Champignon	1	1
Chorea	6	1
Cicatrix. Painful	1	3
Colic. Intestinal	5	2
" Obstruction of bowels		2
Collection of sinuses	1	11
Congestion of liver	1	
" spine (Azoturia)	5	
Conjunctivitis		5
" Ulcerated	1	
Constipation		2
Contracted heels	11	20
Contraction of the flexor tendons	2	1
Contusions	3	6
Convulsions	5	1
Corns	6	15
" Suppurating	2	1
Crapandine	2	1
Curb	1	6
Cyst. Serous	2	5
" Testicles		1
Degeneration. Fatty liver	1	
Deafness	1	
Diarrhœa	2	2
Dislocation of eye	1	
Distemper. Dog	18	3
Docking	2	
Dropsy. Abdominial	1	
Ears. Cut	1	
Eczema	6	19
Elephantaisis	2	1
Emphysema		1
Erythema		2
Eventration	1	
Examination for soundness		61
Fistula. Ani		1
" Fetlock		1
" Withers	6	12
Foreign bodies. Bone in throat		1
" " Foot		1
" " Ear		1
" " Needle in tongue		1
Fractures. Ribs	1	
" Humerus		3
" Pelvis	1	1
" Scapula		2
" Tibia		3
Founder	1	4
" Chronic	5	2
Gastritis	3	4
" Chronic	2	
Gastro enteritis	5	2
Grease		3
Hæmorrhage		1
Helminth Ascaridsea	2	7
" Tænia		2
Hernia. Insigual		5
Hoof broken	1	
Immobility		1
Impaction of rectum	3	1
Indigestion. Chronic	3	11
" Intestinal	2	4
Inflammation. Sheath of tendon	1	2
Influenza	3	1
Ingrowing nails		1
Interfering		1
Keratitis		2
Lameness. Shoulder		1
Lampas		2
Lactation	1	
" Nervous		3
Laryngitis	1	6
" Chronic	2	
Leucocythæmia	2	
Locomotor ataxia	1	
Luxation of hip		1
Navicular disease	3	9
Necrosis	1	2

	Hospital.	Out Patient.
Mange	18	9
Meningitis	3	
Onychia		1
Opthalmia Periodic		7
“ Traumatic	6	4
Osselettes	3	1
Paralysis	1	
“ Traumatic		1
“ Lower lip. Melanotic		1
“ Lumbar. Dog		1
“ Penis		1
Parotiditis		1
Pharyngitis		1
Phimosis	1	
Peruosititis	5	2
“ Rheumatic	1	
Pneumonia	9	3
Peritonitis		2
Pemphigus		1
Pleurisy	1	
“ Traumatic	1	
“ Chronic	2	
Poisoning. Mercurial	1	
“ Lead	1	
Poll evil	4	7
Pricked foot	2	7
Prostrate. Enlarged	1	2
Quarter crack	4	8
Quittor	6	3
Ringbone	11	12
Ringworm	1	4
Roaring	2	6
Rupture. Muscular	1	3
Shoe boil	4	6
Shoeing	2	141
Sidesbone	4	7
Spavin	13	17
Spayed. Bitches	10	1
Splints	3	3
Strain of fetlock	2	1
“ Ligaments of cervical vertrebra	1	
“ Suspensory ligaments	1	2
Suppurating sole	1	
Synovitis. Carpal sheath	8	14
“ Great sesamoid sheath	6	7
“ Hock	2	1
“ Patella	1	2
“ Femoro coccygeal		1
Surfeit	1	6
Teeth. Filed		37
“ Irregular		2
“ Removed		4
Thrush	4	7
Thumps. Spasm Diaphragm		1
Toe Crack	2	3
Tuberculosis	3	
Trismus		1
Tetanus	2	
Tumors. Carcinoma		1
“ Epithelioma	3	11
“ Fibroma	4	3
“ Sarcoma	1	2
“ Lypoma	2	1
“ Melanotic	2	
“ Myxoma		2
“ Sebaceous		1
“ Vasculo-Fibroma		2
Ulcers	4	6
Urethritis		2
Wounds. Bites	1	
“ Incised	2	2
“ Lacerated	6	5
“ Surgical	2	1
Diagnosis (unrecorded).*		
Total	353	867

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*Owing to confusion of a new establishment, a certain number of papers containing records were lost.

The following cases are selected from the hospital register as offering special features of interest:

Nervous Lactation.—Skye terrier bitch, 6 years old, has never been with male, during the last three years has been in heat several times, and at regular intervals of about four months has had the mammary glands fill with milk. At this period the animal has made her nest, selected an india-rubber ball (the same ball each time from among a number of others), and nursed it for several days, when the lactation ceased. Each lactation was accompanied by an acute gastritis requiring treatment, the last attack, gastro duodenitis, ended fatally. The autopsy showed a liver in advanced stage of fatty degeneration and sclerosis.

Strain Cervical Ligaments — Simulating Luxation — Syncope from Pain.—Bay gelding 6 years, 16 hands, work horse, lymphatic temperament. Found cast in stall on near side, with halter strap under off hind foot, head and neck bent in corner of stall. On being loosened got up, little injured except that head and neck were carried to off side, convexity of neck on near side showed bony prominence of transverse processes of first five cervical vertebræ. Attempted reduction by pressure on shoulder and anterior extremity of neck on concave side, counter pressure center of neck on convex side with only partial success. The animal evinced great pain and suddenly fell, entirely unconscious, pulse feeble, and surface cold Recovered consciousness in five minutes, after application of cold water and ammonia.

Application of blister to convex side of neck; no result.

Lobular Pneumonia.—Embolism Filaria Immitis (Leidy). Irish setter, 6 years, had distemper in second year, no history of exposure. Broncho-pneumonia both lungs, emaciated, fever moderate, appetite fair, improved slightly under treatment for three weeks, fever and local symptoms unchanged, pleurisy right side, death in five days.

Autopsy : Excessive emaciation, lobular pneumonia both lungs, pleurisy right pleura, heart dilated, right ventricle and auricle filled with filaria immitis, at each spot of pneumonia and embolism of two or three to a dozen parasites, a few tubercles formed by encysted parasites, other points degenerated into abscesses.

Double Penis.—Gray gelding, 8 years, 16 hands, coach horse, has been unable to protrude penis for two years, purulent discharge from sheath since three months. Examination reveals cavity dorsal surface of penis with evident fibrous band; cast, on drawing out penis found, on dorsal surface at point of reflection of tegument from penis to internal lining sheath, a small rudimentary but perfectly formed penis about the size of a man's. Urethral opening of rudimentary penis leads to duct through entire length ending in cul-de-sac above corpus cavernosum of normal penis. Excessive secretion of sebaceous matter has acted as irritant and and caused abscess. Amputation. Recovery.

Pelvic Lipoma.—Recovery. Bay gelding, 7 years, road horse, constipated for four weeks, only passage a fluid mixture in small quantity, three days ago sudden discharge of purulent matter and freer evacuation of excrement. Rectal examination, find above rectum a tumor, size of child's head, opening from upper wall of rectum easily dilated to size of hand and leading to abscess cavity. Enucleated by hand and scissors removing in sections through natural opening. Recovery in three weeks.

Pelvic Melanosis.—Death. Gray gelding, 15 years, 15.3 hands, roadster. Melanotic tumors on under surface of tail for several years, tumors right side of anus noticed two months ago, since that time has been constipated, for last ten days no passage beyond slight serous diarrhœa, general depression. Rectal examination shows large irregular tumor size of canteloupe above and to right side of rectum. Incision to right of anus through ischio-anal muscle, enucleation of tumor by hand and scissors, anterior pedicle size of goose egg, hæmorrhage of internal pudic or large branch of it, elbow length from external wound, tied en masse after loss of about four quarts of blood. Little fever and favorable condition for sixty hours, sudden rise of temperature, sensitiveness of abdomen—peritonitis—death.

Remarks. Incision would have been better through roof of rectum, and anterior pedicle should have been left, instead of the traction required to remove it which produced the hæmorrhage and brought cavity into immediate contact with peritoneum.

Sarcomatous Diathesis. Awakened by castration, gray colt, 2 years, 15.3 hands, model of draft horse. Two small tumors on right inferior thoracic region. Castrated. Healing slow, discharged in five days, returned twelve days from operation with œdema sheath of penis, tumors, size of goose egg on left cord, size of a setter's head on right cord and new formation right side of sheath. Removed tumors of cord from sheath and tumors side of thorax and found all sarcomatous. Wounds healed rapidly. No return during next six months.

Fracture Femor. Recovery. Bay gelding, 9 years, 16 hands, common lymphatic work horse, spavin off hock, cast, fired, on getting up showed great lameness and inability to use off hind leg, fracture of femor upper third. Owner refused to abandon, placed animal in slings, but slight febrile reaction, appetite good, removed from slings in seventy-two days, lame, but can use leg, gradual diminution of lameness, in four months visible shortening of leg, but little lameness. Destroyed. Autopsy, comminuted fracture of head of femor and great trochanter, firm moderate callous.

Fracture Lumbar Vertebræ, no symptoms for three days, bay gelding, 7 years, 16.1 hands, work horse.

Entered for quittor off hind, cast, operation, got up, noticed slight shaking of tail, but walked to stall same afternoon, the next and third day walked into foot-bath, apparently much better, less lame. On fourth day found on side, refused to get up. Fifth day got up when urged by whip, stands readily, can lift any one foot singly, cannot walk, falls in few minutes. Death. Autopsy shows fracture through body of first lumbar vertebra, hæmorrhage into small psoas. Animal showed no paralysis or anæsthesia of posterior extremities.

Open Hock Joint Recovery.—Bay gelding 9 years old, coach horse, a large lacerated wound of the anterior face of the hock joint from a barbed wire fence. Anterior face of the hock a lacerated wound about three inches long in a transverse direction, interesting the anterior attachment of the muscular portion of the flexor metatarsi and the synovial bursa. An abundant discharge of synovia was present, estimated to be at least 5 or 6 oz. in the 24 hours, no purulent infection of the synovial membrane was discovered. The wound after being thoroughly cleansed and disinfected, was dressed with an antiseptic compress dressing, using a narrow flannel bandage thoroughly wet, and applying it as a single spica. This dressing remained about ten days causing a small slough of the skin over the gastrocnemii tendon, but the wound in the hock was closed. It was afterwards treated as an open ulcer, recovery was very prompt, the animal returned to work in 28 days.

Omental Hernia (*Traumatic*) *Recovery.*—Bay mare 10 years old, worked in a dump cart, while driving along the street some one called the driver's attention to the fact (to use his own words) "that his horses guts were coming out," he supported the mass by a piece of sacking attached to the shafts of the cart and in this way drove to the hospital. An examination showed a punctured wound of the abdominal walls inferiorly, a few inches posterior to the costal cartilages; from which had escaped a mass of omentum as thick as the three fingers and over two feet long. Two large pins were passed through the lips of the wound and the omental mass, a figure of 8 ligature applied and the omentum cut off close to the belly, a mustard plaster was now applied to the whole of this region causing, as was intended, a large œdematous swelling. The animal never showed the slightest unfavorable symptom and returned to work in five days.

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SELECTIONS FROM FOREIGN PERIODICALS.

Poisoning of Horses by the Indian Pea, "*Lathyrus Sativus.*" Condensed from the lectures of Professor James McCall, Principal Veterinary College, Glasgow.

In considering the diseases which attack the larynx and lead to roaring in horses, attention was called to a specific form of the disease produced by the vetch or pea imported from India.

The animals attacked presented the following symptoms: difficult breathing, each respiratory movement being accompanied by a loud sound which seemed to come entirely from the larynx; pulse quick, irregular and intermittent; profuse perspiration; temperature normal; death generally occurring suddenly by "Apnœa."

Post-mortem examination revealed conjestion of the mucous membranes, especially of larynx and stomach, with serous exudation beneath and an accumulation of mucus and blood mixed with air in the bronchial tubes. The ganglionic of the motor cornua of the spinal cord were diminished in number and atrophied.

The cause of the disease was found to exist in the food, as only those horses were attacked which had been fed on a mixture containing Indian peas.

The toxic agent seems to have a direct influence on the nervous system, having the power of disturbing the function of the nerve-centers, especially those which control the circulation and respiration, its continued action resulting ultimately in organic disease, not only of the nerve-centers themselves, but also of the organs supplied by them.

No bacillus is found in the blood of the affected animals, although Prof. Williams is inclined to believe that the dirt surrounding the pea contains some variety of micro-organism. This latter theory is contradicted by the fact that no microbes are to be found on microscopic examination and that there is no increase of temperature. Moreover, change of diet arrests the disease which would not happen if these bacteria once entered the circulation.

The *Lathyrus Sativus*, then contains a poison, and this poison acts especially on the recurrent branches of the pneumo-gastric nerve.

J. O'LEARY, M.D.

THROMBOSIS OF THE ILIAC ARTERIES, complicated with Arteritis, Embolism and Gangrene. By M. M. Cadeac and Maley.

In veterinary medicine, the case of gangrene following the stoppage of circulation in a limb in consequence of arterial plugging, has not been hitherto observed. Although the occurrence has long been considered possible, yet a case has not been described. On an old horse, put aside for surgical operations, the above authors have found the lower part of the off hind limb œdematous and cold ; the hair about these parts could be removed in handfuls.

Autopsy demonstrated that this moist gangrene of the whole of one extremity was due to the destruction of the iliac arteries, external and internal of the right side, by an old blood-clot, stratified and adherent, which was prolonged into all the divisions of the above arteries, without completely obstructing them, and being broken at different points.

Microscopic examination showed that the finest arteries were plugged by the blood-clot. The internal coat of the vessels plainly showed the changes wrought by inflammation, of old standing in some points and more recent in others. In consequence of stagnation of blood in the vessels hemorrhages were produced, principally in the muscular interstices of the upper part of the limb. The authors have not been able to note the complete symptoms of this case, but, such as it is, their observation merits record.—*Revue Veterinaire*, November, 1885.

(*b*). *Aneurism of the Aorta and Endocarditis Chronica.*—Wolff found in a stud-bred horse, twenty years old, the posterior aorta from its origin, 40 c.m. in length, all in knots. The knots were of three sizes. The tricuspid valves were much thickened, and the heart was hypertrophied. No interference of the circulation, as a result of these knots, could be detected during life.

(*c*). Guckel describes an enlargement in the neighborhood of the kidneys, in an ox, which was fully the size of a man's head, and was surrounded by a yellowish-colored membrane. The swelling weighed twelve pounds. On section the swelling showed several large blood-vessels, in which two fingers could be easily introduced at a time, and which ended in blind sacs. The smaller sacculations contained a dark-red, gritty blood. The membrane surrounding the enlargement was also of a dark-red, hæmorrhagic appearance. Many of the vascular sacculations, in the interior of the growth, were in connection with the vena cava posterior.—*Archiv fur Wissen. u. Praktische Theirheilkunde*, *Band XII.*, *3 und 4 Heft*, *1886.*

(*d*). *Beri-Beri.*—Professor Lacerda (Report to the Academy of Medicine, 29th January, 1884) practised inoculation of a cultivation of blood from the tongue of Beri-beri patients in beef-tea (*sterilised*). This beef-tea, on being examined, showed the evolution of certain microbes. Inoculation of this broth of cultured microbes killed rabbits more or less rapidly, and their organs were full of the same microbes, i.e., *bacilli.* He noticed that large quantities of bad rice had been eaten by a Beri-beri patient, and immediately examined the rice and found it the dwelling-place of the same microbes which he had found in the bood of patients suffering from Beri-beri. Rats that ate the rice died, and their organs contained the bacilli.

Kœniger (Archives for Clinical Medicine, 1884) attributes the disease to miserable food and sanitary arrangements. Mendes (Contributions to the Study of Beri-beri, 1884) also found microbes in the dilated blood-vessels of the brain and cord of patients suffering from Beri-beri. Lodewijks and Wiess mention atheroma of the blood-vessels and of the heart as a frequent complication of the disease. Baels (Seitschrift f. Clin. Med., 1882) describes multiple peripheral neuritis as a frequent complication of Beri-beri.

Ballet (Societe Anatomique, July, 1883) describes a form of paralysis consecutive to Beri-beri.

Morehead, a great Indian authority, asserted the similarity between Beri-beri and scurvy.

Dr. Wallace Taylor has satisfied himself that Beri-beri is due to the presence of a bacterium.

Dr. M. Ogata, of the Medical Department of the Japanese Imperial University, has carried out experiments on the bacterial origin of Beri-beri, or *kakke*, for the last four years. Dr. Ogata comes to the conclusion (*Official Gazette*, April 13th, 1886) that the bacterium present in *kakke* may be cultivated and distinguished by its behaviour under cultivation; that it causes symptoms of *kakke* in monkeys, dogs, rabbits and other animals; that an acid substance, obtained during the development of the bacteria in nutrient fluids, causes paralysis of the hind limbs in animals. The poison enters chiefly through the digestive system. Dr. Wallace Taylor found that, in 134 cases, the average richness of blood corpuscles was 94 per cent. of the normal. Of the coloring matter (hæmoglobin) of the blood, he found 81 per cent., the amount being sometimes as low as 65 per cent. He, however, finds no relation between the severity of the disease and the proportion of hæmoglobin. Marked anæmia in Beri-beri is met with only in cases complicated with digestive or other derangements. Dr. Wallace Taylor frequently found that subjects of Beri-beri had been made so much worse by being sent to the hills for a change, that he now never gives his consent to the moving of patients where cardiac debility is marked, as weakness of the heart is the chief cause of mortality in this disease. Dr. Wallace Taylor was the first to suggest that Beri-beri was similar, in many respects, to the common diseases, known in India and some parts of Burmah under the name of *Kumri*. There is a chronic form of Beri-beri, which, he suggests, is still more closely related to Kumri than the acute form. The bacterium of Beri-beri is not found in the blood of patients suffering from Kumri, and whilst Beri-beri is generally acute and only occasionally chronic, Kumri, on the other hand, is generally chronic and rarely acute.

R. W. Burke, V. S.

Veterinary Quackery.—An interesting result of veterinary quackery is reported in the *Oesterreichische Vierteljahrschrift fur Veterinar Kunde* (1885, X, p. 187). Dr. Swaty met a countryman on the road whose horse had a leather bandage on the right side of the head. He induced the man to remove it, and to his surprise found both the greater and lesser sinuses (antrum of Highmore) of the right maxilla *open!* The nasal cavity was also partly exposed. On inquiring, he learned that the horse had been purchased in 1859 as a yearling. In January, 1861, warts developed at various points, several being situated on the face. To remove these the owner used an ointment given him by a quack. The warts were incised and the ointment "generously" applied. The result was an intense inflammation, and two weeks later the warts, together with the underlying skin and the bony lamella, fell off. The margins of the gap thus produced healed rapidly. With this enormous defect, which was protected by the leather bandage referred to, and carefully cleansed every fortnight, the poor horse *worked twenty-four years in good health* without any disturbance of health, and, most remarkable of all, no local disturbance of the exposed mucous membranes. The destroyed bone included part of the lachrymal, upper maxilla and nasal bones, as well as the upper meatus. The right frontal sinus could be seen into from the gap.

E. C. Spitzka, M. D.

The Etiology of Glanders,* by Dr. Loefler.

The existence of glanders or glanders-farcy, was known to the ancients, and Hippocrates has left us a description of its symptoms characterized by the truthfulness and realism which stamp all the writings of the Father of Medicine. The question of the contagiousness of the disease was long under discussion and was not definitely settled until the beginning of the present century, when experiments conducted simultaneously in Germany, England, and France placed the matter beyond dispute so that now it is universally conceded that the characteristic secretion of the disease is eminently contagious. The investigations of Chauveau in France, and Hallier in Germany, have established not only the parasitic origin of glanders, but point to the identity of its virus with that of syphilis. Concerning this supposed identity of the two poisons, however, later and more reliable researches have contributed no positive assurance. The experiments of Koch have proved in addition to the fact that glanders are the product of micro-organisms residing in a congenial medium, the equally interesting fact that the spores of farcy are distinctly *sui generis*, and thus constitute it a contagious disease of a different nature from tuberculosis. The researches of Claude Bernard had already inspired the belief that this was the case, but the more careful and scientific methods of Koch threw such light on the matter that these points are now regarded as placed beyond the pale of dispute. Touching the liability of other animals than the horse to contract the disease from exposure to contagious influences, it has been ascertained that the goat and the cat evince an extraordinary degree of susceptibility to the poison of glanders and exhibit *post mortem* evidences of the virulent activity of the disease. The ruminants enjoy almost complete immunity from the contagious action of glanders, though inoculation has been attended in many cases with eruptions and some constitutional disturbance, but in no instance sufficient to warrant the view that the disease had been communicated. Experiments made upon the dog prove at least that the animal is not a fit subject for inoculation with the virus of glanders, since the train of symptoms developed thereby, though grave and in some instances fatal, have given no evidence that these were caused by a specific poison. The practical conclusion to be deduced from the most recent experiments made in connection with the disease are that prophylaxis of the most vigilant kind can alone arrest the spread of this destructive disorder, and that it is better to sacrifice the lives even of suspected animals than to incur the risk of propagating the disease by the employment of therapeutical measures of questionable value.

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* Arbeiten aus dem Kaiserlichten Gesundheitsamte. Vol. I. Berlin. 1886.

C. M. O'LEARY, M. D.

HÆMOGLOBINURIA FROM COLD IN THE HORSE AND ITS RELATION TO THAT OF MAN, by Dr. Floriano Brazzola, in *La Clinica Veterinaria*, July and August, 1886.

Notwithstanding the time and labor devoted to the study of Hæmoglobinuria, its pathogenesis is very obscure, and this is especially so in regard to the form under consideration.

Difference of opinion as to its nature exists, the lesion being thought to be renal by some, spinal by others; many think it consists in an altered condition of the blood, dyscrasis, while in the opinion of a few it is nothing more than a rheumatic affection of the muscular system.

The symptoms as described by Friedberger and Frohner are as follows: the animal is attacked on being taken from a warm and badly ventilated stable and placed in service without having any change made in his food, the attack resembling acute rheumatism with partial paralysis posteriorly and trembling gait and impaired sensibility. The urine is scant and high colored. The spectroscope reveals coloring matter of the blood, but no blood globules, or very few, are to be found under the microscope. Chemical examination shows a large quantity of albumen. Pulse and respiration frequent. Peristaltic movement of intestines diminished or nearly suspended. One attack predisposes to another.

The anatomical lesions according to Bollinger are: thick, black blood, pale muscles, clay colored liver, flacid kidneys, increased spinal subarachnoid liquid, and injected vessels in spinal meninges, especially in lumbar region.

After numerous observations, I have noted the following facts:

The disease declares itself suddenly on exposure of the animal to a low temperature, which acts on the cutaneous surface, the symptoms being restricted movements, profuse perspiration, tremblings, vague colicy pains, paralysis of posterior extremities, hæmoglobinuria and albuminuria. The fever is limited at first, reaching a high grade only during the last days. The pulse is small and frequent, heart beat confused, dyspnœa urgent, and slight gastro-enteric catarrh. The cause of death is profound degeneration, especially of the cardiac muscle, and slow poisoning by carbonic acid.

Autopsy revealed dark diffluent blood with leucocythacmia and destruction of red globules, degeneration of the muscles, hyperæmia of the tissues, œdema and softening of the spinal cord.

Many authors claim that the essence of the disease consists in a primary inflammation of the kidneys. Among them may be mentioned Hofer, Achaty, Meyer, Brückmuller and Zundel; also Clement, in the *Journal of Comparative Medicine and Surgery.* The writer, without denying the possibility of a true nephritis, which, however, is always secondary, thinks that the lesions described by them cannot be ascribed to a true inflammatory process, and cites cases in which the symptoms developed themselves rapidly and death took place without any renal lesion being discovered.

The endeavor to identify this disease with Bright's disease in man is absurd.

Opinions differed as to the pathogenesis of Bright's disease since Bright himself, in 1827, recognized the existence of dropsy dependent on renal affection, accompanied by albuminuria.

Frerichs, in 1851, announced the lesion to be a peculiar process which commenced with hyperamia, followed by exudation and degeneration of the parenchyna and terminating in renal atrophy.

Kleps, in 1870, identified it with a primary interstitial nephritis.

Virchow, in 1871, distinguished three forms; parenchymal nephritis, interstitial nephritis and amyloid degeneration.

Thus we see that no relation exists between Bright's disease and the one under consideration, neither from the physio-pathological nor from the anatomo-pathological point of view.

A second series of authors admit the essence of the disease to be an alteration of the blood secondary to an introduction of an infective substance, thus: Zundel, Lausch, Lowoch and Hering admitted an alteration of the blood and kidneys.

Spinola, Vogel, Haubner, but especially Bollinger, were positive in ascribing it to a primitive alteration of the blood. The latter thinks the essence of the disease consists in this condition leading to hæmoglobinuria, acute nephritis, with albuminuria, œdema, paralysis of the lower extremities. To sustain his view he refers to the observations of various authors who noted the alteration of the blood, muscles and liver, which proved the existence of a septic material in the blood. He does not recognize cold as a cause of the disease.

Vogel, also, in his latest communications, comes to the same conclusion and thinks that the germ of the disease is generated in the stable.

The writer admits an altered condition of blood as the explanation of hæmoglobinuria only, not of the other symptoms, and does not agree with Bollinger, who considers the presence of hæmoglobinuria in the urine as the pathognomonic symptom. According to Ponfick, hæmoglobinuria should be the term applied to the disease.

Frank recognizes the disease as a spinal paralysis, with secondary paralysis of the renal nerves; Friedberger admits a hyperæmia of the spinal cord and membranes; Ableitner and Koniger think it a rheumatic inflammation of the lumbo-sacral portion of the cord; Göring, as a congestion and Csokor as anæmia of the same.

In my opinion, the alteration of the central nervous system cannot be recognized as essential, as it might be only a manifestation of hyperæmia anæmia or inflammation of the medulla spinalis.

In conclusion, I agree with Murri that the pathological process consists in a condition of abnormal excitability, caused by the action of cold on the cutaneous nerves reflecting on the vaso-motor fibers, followed by increase of caliber of the blood vessels, slackening of the circulation and diffuse stasis. This explains the clinical and anatomo-pathological picture already given. *Hæmoglobinuria periodica* of man and this morbid condition in the horse are closely related, both as regards their essence and their pathogenesis.

J. O'LEARY, M.D.

PROCEEDINGS VETERINARY MEDICAL SOCIETIES.

ANNUAL MEETING OF THE NATIONAL VETERINARY AND SANITARY ASSOCIATION OF THE UNITED STATES.

President Huidekoper in the chair. The committee of investigation submitted the following report:

Your committee on investigation have had under consideration the work assigned, and beg leave to report that the disease now prevalent among the cattle in the distillery stables and elsewhere in the city of Chicago and vicinity is contagious pleuro-pneumonia, lung plague, or lungen suche, which terms are synonomous. And your committee are further of the opinion that the only way in which the infected localities can be freed from the contagion is by the slaughter of all diseased and exposed animals and a careful disinfection of the infected premises.

The report was adopted. Dr. Hopkins introduced a resolution against inoculation, which was referred to a committee.

The report of the committee on permanent organization was read by Dr. Hopkins, of Wyoming. It was taken up section by section. After undergoing some modifications a constitution was adopted, as follows:

ARTICLE 1. This association shall be known as the National Veterinary and Sanitary Association of the United States. It shall consist of State, territorial and government veterinarians, members of sanitary boards and live stock commissions, and representatives of veterinary colleges, associations and journals.

ART. 2. The purpose of this association shall be to contribute to the diffusion of true science, particularly the knowledge of sanitary science, as applied to the prevention of the spread of contagious diseases among domestic animals.

ART. 3. The officers of this association shall consist of a president, two vice-presidents, a secretary and assistant secretary; all of whom shall be elected at each annual meeting, and a majority of all votes present shall be necessary to a choice.

ART. 4. It shall be the duty of the president to preside at all meetings of the association. The usual parliamentary rules shall govern.

ART. 5. It shall be the duty of the secretary to keep a correct record of the proceedings.

ART. 6. It shall be the duty of the president to appoint a committee at each annual meeting to take up a collection or make an assessment to defray necessary expenses.

The committee on resolutions reported the following:

Whereas, The existence of contagious pleuro-pneumonia among animals in the United States is annually a source of great loss.

Whereas, The great cattle industry, commerce and food supply of the country are peculiarly threatened by the recent extension of contagious pleuro-pneumonia, and

Whereas, Real and alleged outbreaks of contagious disease require constant investigation and control; therefore, be it

Resolved, That the State veterinarians and veterinary sanitary boards of the United States in convention assembled, recognize the wisdom of congress in establishing the bureau of animal industry, and while heartily appreciating the valuable services rendered by the bureau in the past, we would recommend such additional legislation as to enable it to effectually extirpate contagious pleuro-pneumonia, and to control such other diseases as may from time to time appear.

Dr. Hopkins said he must take exception to the allusion to the valuable services of the bureau of animal industry. This bureau had actually been useless. It possessed no power to go into any herd except by the courtesy of the owner.

Dr. Atkins and others supported the resolutions.

The association then proceeded to an election of permanent officers. J. L. Brush, of Colorado, was unanimously elected president. Dr. J. D. Hopkins, territorial veterinarian of Wyoming, and Dr. V. T. Atkinson, State veterinarian of Wisconsin, were elected first and second vice-presidents, respectively, without any opposition. Dr. Paul Paquin, State veterinarian, of Missouri, was elected secretary, and Dr. M. R. Trumbower, of Illinois, assistant secretary.

In taking the chair, Mr. Brush said he was particularly grateful to the delegates for electing him, because it was a recognition of the lay element. He hoped the association would be able to stamp out pleuro-pneumonia, for if it ever got a start on the ranges of Colorado and the West, it would never be stamped out, and it would annihilate the cattle interest there.

Dr. Hopkins asked if the committee on resolutions had no other resolutions to report. He had introduced at the morning session a set of resolutions against inoculation, and he would ask if the committee did not intend to report them back.

Dr. Atkinson said the committee had considered the resolutions and would beg leave to report them back to the board without recommendation. Dr. Hopkins moved the passage of the resolutions. Dr. Huidekoper gave a history of the practice of inoculation in European countries since it was first discovered. He thought inoculation had always been condemned except in localities already thoroughly infected. In this country, where the disease was not permanent, it would be highly dangerous. Dr. Atkinson said the committee had been in full accord with the sentiment of the resolutions, but had not wished to incumber the business of the association with these resolutions. It was the intention to present the resolutions adopted at this convention to the Cattle-Growers' Association, and if these resolutions were added to those urging the necessity of stamping out contagious pleuro-pneumonia, the effect of the latter would be weakened.

Dr. Faville said the question of inoculation was a technical one, and he did not want to see any side issues draw away the attention of the cattle-growers' convention from the vital issue.

The resolution was finally adopted. The president was instructed to present the resolution on the subject of pleuro-pneumonia and those of Dr. Hopkins at the cattle-growers' convention.

SEMI-ANNUAL MEETING OF THE MISSOURI ASSOCIATION.

The semi-annual meeting of the Missouri State Association of Veterinary Science and Comparative Medicine was held in December, at Dr. James', 1029 Leffingwell avenue. The Secretary read a paper by T. A. Edwards, M. D., of Marshall, Mo., on "Professional Worth." The doctor made one novel statement in his essay, that Michael Servetus was burned by Calvin because of his teaching the circulation of the blood.

Theologians usually say it was because Servetus was a kind of Unitarian. He went on to say that the physician, even more than the clergyman, must be a man of professional worth, a man of real unselfishness. He held that as veterinarians rightly conducted themselves they will earn respect. He was very severe on people who belittle the true veterinary profession. The paper was decidedly witty and sarcastic in parts.

Speaking of the paper, Dr. Paquin told of the chair of comparative pathology at Columbia. He showed the necessity of that study for the ordinary practitioner. Three men had died of glanders during the last year, and no physician was able to diagnose their cases. The fact was brought out that the quarantine law was excellent and very strict, if enforced.

Veterinary Surgeon James described a case of pannus in a horse's eye, which had come under his observation. He treated it with mucous from a pink-eye patient, then with nitrate of silver, and was thoroughly successful. The disease he had seen very frequently in dogs.

After this the President called attention to the fact that the sanitary law of the State provided only one veterinary surgeon for the whole State, and provided no assistants at any time. Besides, no provision was made for the study of special diseases, such as hog cholera. Dr. Tiffany described the provisions of Illinois law, where the practical veterinarians over the State were empowered as assistants to the Live Stock Commission. They were paid per diem only, and expenses.

Dr. Paquin was ordered to consult with Mr. Proctor, author of the law, on the subject.

The doctor gave an account of his visit to Europe, principally to study hog cholera. Dr. Salmon held that the French and American diseases were different. Externally the lesions were the same. Dr. Paquin was almost certain that the same germ caused each disease. Hog cholera was not vaccinated against with success, only for certain breeds. They inoculate through rabbits. The operation was a particularly delicate one. The doctor discussed it and kindred subjects at considerable length.

VETERINARY MEDICAL ASSOCIATION OF NEW JERSEY.

Veterinary surgeons, from almost every county in the State of New Jersey, met in convention at the American House, in the city of Trenton, on Thursday, the 9th day of December, 1886, to consider the subject of veterinary legislation.

The legislative committee, of which Dr. J. W. Hawk, of Newark, was chairman, met at 10 A.M. After considering the merits of several bills, the committee endorsed the bill drafted by Dr. Wm. Herbert Lowe, of Paterson. The object of the bill is to regulate the practice of veterinary medicine and surgery in the State of New Jersey, and is similar, in many respects, to the one in force in regard to practitioners of human medicine.

At 11.30 A.M. the regular session was called to order by President Miller, of Camden County. After calling the roll, Dr. Lowe read letters from Dr. W. H. Pendry, Dr. D. J. Dixon, and others, in which they expressed a deep interest in the affairs of the association.

The secretary read the minutes of the Long Branch meeting, which were adopted.

The treasurer, Dr. L. R. Sattler, of Newark, reported in regard to the finances of the association. The secretary made no report.

Dr. Miller next called for the report of the committee on veterinary legislation. The chairman stated that they were in favor of the bill drafted by Dr. Lowe. By this time, Dr. E. M. Hunt, secretary of the New Jersey State Board of Health, had arrived, and the president took advantage of the opportunity by requesting him to give his views upon the subject under consideration, before the association took action. Dr. Hunt said that the bill just recommended by the legislative committee was an excellent one, and that he approved of it in most respects. The third section of the bill is to the effect that any person who shall have been practicing veterinary medicine or surgery in the State, for a livelihood, for a period of not less than ten years immediately preceding the passage of the act, without having obtained a diploma from a legally chartered or incorporated veterinary college or university, as provided for in section 2 of the act, may, at the next regular meeting of the Veterinary Medical Association of New Jersey, present himself to the Board of Censors for examination, and if he should be found worthy, would be allowed to register and continue practice.

Dr. Hunt said that any person who had had twenty years' experience in the practice of *human* medicine or surgery in one locality in the State, immediately preceding the passage of a certain act of the Legislature, could make affidavit as to the facts and register and would be allowed to continue practice without undergoing *any* examination. He said that if the State Society of Veterinary Surgeons examined non-graduates, and gave them certificates testifying that they were worthy practitioners, that we would elevate their standing much more than we would by allowing them to register without any examination. If this latter course were adopted, he continued, it would be an easy matter to ascertain the professional standing of any particular practitioner, whether a graduate or not. The affidavits of non-graduates would be on file with the diplomas of graduates, and could be examined in the offices of the county clerks. Dr. Hunt's suggestions were approved of, and were incorporated in the bill when it was adopted by the association.

The Board of Censors reported in favor of R. E. Stanwood, of Freehold, and he was elected to membership. Several applications were made for membership, after which the following gentlemen were proposed for honorary membership: Rush Shippen Huidekoper, M.D., V.S., *Dean of the Veterinary Department of the University of Pennsylvania*, and Wm. L. Zuill, M.D., V.S., of the same institution, by Dr. Miller; Geh. Med. Prof. Dr. R. Leisering, Dresden, Saxony, by Dr. Sattler.

After the transaction of routine business the members of the association listened to an able address by Dr. Hunt, on veterinary matters in New Jersey. He told of the work being done by the State Board of Health in stamping out pleuro-pneumonia and other contagious animal diseases prevalent in the State. He spoke, at some length, of the benefits to be derived from the association—social, scientific and otherwise. He said that we, as veterinarians, were fortunate in not having any old troublesome laws to deal with, as had the practitioners of human medicine, and that, in his opinion, little legislation was needed beyond the passage of the bill which had been endorsed by the association. Dr. Hunt said that the medical men of the State had failed, except in getting a general law passed. He said that the association ought to be very careful who they admit to membership and consequently that a very important duty devolved upon the Board of Censors.

The Doctor extended an invitation to the members of the association to visit the library of the State Board of Health at any time. He further stated that a member would be allowed to take a veterinary work from the library upon the recommendation of the President or Secretary of the association.

The Chair appointed Drs. Hawk, Smith, Dustan, Cooper and Loblein, with Drs. Miller and Lowe, members ex-officio, as a committee on legislation, to represent the interests of the association at Trenton and to present the proposed bill to the Legislature.

Upon motion of Dr. Loblein, the secretary was instructed to have copies of the bill printed and sent to members of the association as well as to the Legislature.

The President appointed Dr. Loblein essayist for the next regular meeting.

The association decided to hold the April meeting in Newark. The place of meeting to be selected by a committee consisting of Drs. Sattler, Vogt and Hawk, all of Newark.

After a prolonged session the members adjourned for dinner.

WM. HERBERT LOWE, D.V.S., *Secretary.*

ONTARIO VETERINARY MEDICAL SOCIETY.

For a number of years a Veterinary Medical Society has been in existence in connection with the college. Through the energy of the president and the enthusiasm of the students, this Society has been exceedingly successful. The meetings are held twice a week, the attendance at each meeting ranging from two hundred and fifty to three hundred. Two or more essays or communications are read each evening by the members, and each essayist is expected to defend his paper against the criticism of any one of the two or three hundred fellow-students who form his audience. The training in public speaking and debating received in this Society proves of value in after life to those taking part in it.

At the regular meeting of this Society, an interesting pathological specimen was presented; this being the heart and aorta from a patient who had suffered from complete aphonia during the later months of his life. So puzzling was the ante-mortem examination that there was wide diversity of opinion between the experts in regard to the condition present. Post-mortem, this was found to be an aneurism of the aorta, pressing upon the left recurrent laryngeal nerve. Paralysis of this nerve followed, with complete loss of voice. In view of this occult pathology of "roaring" in the horse, such specimens may be of great importance. In the many cases of the above affection coming under the notice of veterinarians, the roaring has generally to be credited to atrophy and degeneration of muscles of the left side of the larynx. The cause of the atrophy is generally wrapped in obscurity. Very seldom does a post-mortem examination reveal aneurism, or tumor of any kind, pressing upon the left recurrent nerve. So difficult is it to find a cause that Professor Williams holds this condition to be one of "Paralysis Atrophica" (Progressive Muscular Atrophy), in which, he says, the the paralysis begins in the muscles themselves. This is a suggestion worthy of careful investigation, although the supposition that this form of paralysis originates in the muscles themselves has been disproved by more recent investigation. "Progressive muscular atrophy originates from functional or structural changes in the nervous centers or their nerves" (J. Lockhart Clarke). Even granting that laryngeal paralysis in the horse is due to progressive muscular atrophy, the above remark would cause investigation again to be directed to the nerves, to discover the cause. Unfortunately for comparative pathology, no examination, in the case above spoken of, was made of either the laryngeal muscles or of the recurrent nerve in its structure. But in this patient the aphonia was complete; in cases of roaring the loss of voice is not necessarily so.

AMERICAN HEALTH ASSOCIATION.

That vigorous organization, known as the American Health Association, held its annual meeting for 1886 in the City of Toronto. This association is composed of all gentlemen who take an interest in sanitary matters, and embraces in its scope the consideration of all subjects bearing on public health, whether belonging to human or veterinary medicine. The prospect of the meeting had excited much interest, and the sanitarians of the province and city welcomed their visitors warmly. The visiting members were from almost every important point on this continent, and came in such numbers as to render this meeting of exceptional interest. The meetings continued from October 5th to the 8th, and were presided over by Dr. H. P. Walcott with rare ability. Among the many valuable papers presented, one by D. E. Salmon, D. V. M., may be mentioned as of special interest in present circumstances, on "Recent Progress in the Investigation of Hog Cholera." Nearly fifty Canadian members were added to the association, while one of its results appears in the establishment of an Association of Health Officers for the Province of Ontario.

ONTARIO VETERINARY COLLEGE.

The Ontario Veterinary College opened in the large lecture-room of the college in Temperance Hall. There were between two and three hundred students present, and on the entrance of Mr. Andrew Smith, V.S., President of the College, all rose to their feet and cheered him enthusiastically. The class assembled to listen to the introductory lecture of the session, was one of which the college may well feel proud. The students were clever, intelligent looking men, apparently ranging from twenty to thirty-five. A majority are farmers' sons, who have already more or less practical knowledge of the handling and general characteristics of domestic animals; but whether farmers' sons or not. all looked and acted as though they had come for study and hard work, rather than the mere putting in of the time.

Dr. Smith, on taking the platform, after the storm of applause which greeted his appearance had subsided, expressed his satisfaction at meeting his old students of last year, as well as the large class of freshmen which he saw before him. In his address, which occupied about three-quarters of an hour, he gave an interesting sketch of the rise and progress of veterinary science, from its inception among the Egyptians to the present day. That portion of the address which dealt with the history of the profession in France, England, Scotland, the United States, and Canada, was particularly interesting and instructive, and was listened to with the closest attention by all present. In conclusion he pointed out in glowing terms the bright prospects which were open to the diligent and persevering veterinarian on this continent, where the field for practice was almost unlimited, only partially developed, and as yet comparatively unoccupied. He also dwelt with some warmth upon the manner in which the graduates of Ontario Veterinary College had distinguished themselves in the United States and elsewhere, both in practice and veterinary literature.

The Christmas examinations of the Ontario Veterinary College were held on December 20th. The following gentlemen, third year students, passed the official Board of Examiners, and were awarded the Diplomas of the Agricultural and Arts Association :—

Geo. Dunn, Simcoe, Ont.; Jacob McFetzer, Center Valley, Pa., U. S.; John F. Fisher, Brandon, Manitoba; D. Bell, Brampton, Ont.; William Hunter, Brampton, Ont.; W. S. Henderson, Arthur, Ont.; J. H. Hennessey, Hamilton, Ont.: Wm. S. Hibbard, Caledonia, Ont.; George N. O'Leary, Pickering, Ont.; R. H. McIninch, Dakota, U. S.; W. H. McNaughton, Vienna; Ohio, U. S.; J. E. Rayen, Girard, Ohio, U. S.; W. H. Riddell, Orangeville, Ont.; C. Wagg, Goodwood, Ont.; A. C. Wolfe, Goodwood, Ont,; J. H. Thornton, Georgetown, Ont.; M. E. Young, Belville, Ohio, U. S.; T. H. Sterling, New Hamburg, Ont.

J. E. Rayen, J. F. Fisher, W. S. Henderson, and G. N. O'Leary passed with great credit.

C. H. Shirland, Madrid, N. Y., passed a primary examination in Materia Medica.

ONTARIO VETERINARY MEDICAL ASSOCIATION.

The annual meeting of this association was held in Toronto, December 21st, 1886. There was a good attendance of members, the large lecture room of the veterinary college giving the accommodation necessary. Major Loyd, V.S., president of the association, occupied the chair, and opened the proceedings by an excellent address, passing in review many matters of interest to the members.

After routine business, J. Wende, V.S., of Buffalo, N. Y., was called upon, and read a paper on the Etiology of Schirrous Cord, Abscess and Fistula of Scrotum. Many theories have been put forward to account for this sequel of castration (Schirrous cord). Among others, Professor Johne, of Dresden, claims to have discovered a microbe in such growths and holds this micro-organism to be the essential cause. Professor Williams holds it to be due to a failure to separate the cord from its adhesions when the cord is removed, etc. The essayist, however, considers that none of the theories yet published will really account for champignon. The cause is, any foreign body, as blood, pus, etc., being contained in a sac of the serous covering, which sac is produced by the retraction of the cremaster muscle, when enough of the tunica vaginalis is not removed. This he discovered accidentally, while dissecting a case of Schirrous cord. In order to prove this theory, twelve colts were operated on, the cord on one side of several being operated on properly, in the others the sac above spoken of was purposely produced and some foreign body introduced, but of the sixteen cords so treated, fourteen cases of champignon resulted, and two cases of abscess. A spirited discussion resulted, which was taken part in by Messrs. Elliott, Duncan, Shaw, Granside, Hawkins, Gibb, Cowan and others. The opinion was expressed that much credit was due to the essayist for his bold experiments, which experiments would almost certainly injure his local reputation and standing. To such experiments, progress in science is often due. On motion the association passed a hearty vote of thanks to Mr. Wade. J. Hawkins, V.S., of Detroit, Mich., gave an interesting account of his experience with sulphate of eserine, or physostigma. He had found it of extreme value in cases of constipation, with flatulence. It is not so valuable in acute indigestion. A watery solution is used, the dose being half a grain to one grain, given hypodermically, the dose being much larger than is recommended in books. Sulpho carbolate of soda, in doses of four drachms, was the best method of treating the distention found in acute indigestion. The speaker would be happy to obtain the drug (eserine) for those who had not used it.

J. F. Smith uses it by the intra venous method of injection. He agrees as to the slight value of the drug in acute indigestion.

Mr. Quinn gave a short account of his method of operating on cryptorchids, and promised a paper on the subject for the next meeting.

A lively discussion then ensued in regard to proposed legislation for the better protection of the Veterinary Profession in Ontario.

The association resolved that registration of all Veterinary Surgeons be insisted upon, and that no one who is not so registered shall be permitted to practice "for hire, gain or hope of reward." A committee will wait upon the Agricultural and Arts Association to ask their consent to these changes in their Act, and to press the matter upon the attention of the House of Assembly.

The election of officers was then proceeded with, resulting as follows: Honorary President, Professor Smith, F. R. C. V. S., and principal of the Ontario Veterinary College; President, W. Shaw. V. S., Dayton, Ohio; 1st Vice-President, T. C. Grenside, V. S.; 2d Vice-President, J. F. Quinn, V. S.; Secretary, C. A. Sweetapple, V. S.; Treasurer, W. Cowan, V. S., and a Board of eight Directors.

SCOTTISH METROPOLITAN VETERINARY MEDICAL SOCIETY.

The quarterly meeting of this Society was held in the London Hotel, Edinburgh, on Nov. 22. There was a good attendance of members. Professor Williams occupied the chair.

Mr. Rutherford, Edinburgh, introduced a discussion on the suppression of contagious and infectious diseases in the lower animals.

Referring to pleuro-pneumonia, Mr. Rutherford said they had heard a great deal about this disease of late. It was much more common in Scotland and England just now than it had been for seven or eight years. Some authorities proposed killing. He protested against any such proposal in the matter. The disease was as easily handled as any disease he was aware of. Slaughtering, undoubtedly, put an end to the disease, but by this method they involved stockowners in an enormous expense, and it does not necessarily kill out the contagion. And it sometimes happened that they had to kill cattle which it was impossible to replace, while they at the same time were in a manner destroying public money. He held, therefore, that slaughtering was impolitic, and, in view of what they now knew of inoculation, was entirely unnecessary. His proposition was to make inoculation a compulsory operation along with slaughtering, where the disease was known to exist. By that combined method the disease would soon disappear.

Professor Macfadyean said that he would endeavor to controvert several of the views just expressed by Mr. Rutherford; and although he might do so in firm language, he would do it with the greatest good nature. He would confine his remarks chiefly to the pleuro-pneumonia question. Professor Macfadyean said they might recognize four methods of dealing with the disease. The first of these was the method of general compulsory inoculation of all the bovine animals in this country. No sane man would recommend that method, for the very good reason that the aggregate deaths from the operation would far exceed the present annual loss from pleuro-pneumonia. At the same time, he said, this method, if it conferred an immunity from pleuro-pneumonia equal to that conferred by Pasteur's vaccine against anthrax, might reasonably be expected to ultimately suppress pleuro-pneumonia. The second method of dealing with the disease was that advocated by Mr. Rutherford, viz., slaughter of the affected animals and compulsory inoculation of all animals that had been exposed to infection. The advocates of this method claimed for it that it would, if put into general operation, ultimately eradicate the disease; for, say they, all the animals already affected would be slaughtered, the healthy would immediately be protected by inoculation, and the virus that already contaminated the building, being unable to find the system of an animal in which to propagate itself, would soon die a natural death. He would endeavor to state clearly his objections to that train of reasoning, or of assumptions, as he would prefer to call it. Would all the animals already affected be slaughtered when the veterinary surgeon was called in to treat an outbreak? He said no, to that question. He believed that the advocates of inoculation said that they had two crucial tests by which they could weed out the animals already attacked. The first of these was thermometric observation; the second was inoculation itself. With regard to the first of these, he was going to put a question to Mr. Rutherford, or any other member of his way of thinking, viz.: What were the distinctive characters of the temperature chart of pleuro-pneumonia? Unless he was told explicitly in what respects it differed from other conditions of abnormal temperature —simple pleurisy or pneumonia, tubercle, or acute indigestion, for example—he would maintain that some of them had been guilty of making a loose statement that might find credence with the lay public, but would not be accepted by that meeting of professional men. He denied, moreover, the accuracy of the statement that the affected animals would be indicated to them by watching the effects of inoculation, since those already affected would not 'take' the inoculation. His own observation enabled him to say that a cow already affected with pleuro-pneumonia might 'take' the inoculation, and show precisely the same inoculative lesions in the tail as an otherwise healthy animal. To prove his contentions and show that those were not mere fanciful objections, Professor Macfadyean cited cases in which he had made post-mortem examination of cows inoculated one month previously by Mr. Rutherford. These cows showed the usual inoculative lesions in the tail, and at the same time they had pleuro-pneumonia in their lungs. Again, he held that any statement to the effect that the virus in a contaminated building would die a natural death, was a mere assumption; for on that point they could have no accurate information until the micro-parasite of the disease had been isolated and cultivated artificially. Another question that he would like to notice here was this: Does inoculation of the tail produce pleuro-pneumonia? He held that careful reasoning compelled them to answer in the affirmative. He had now stated what appeared to him to be serious objections to the practice of inoculation, and he invited the advocates of the practice to explain them away if they could. He was quite open to conviction, but those who favored inoculation must not be angry if he demanded a reason for the faith that was in them. The third method of dealing with pleuro-pneumonia was that of compulsory slaughter of the affected, and isolation of those that had been exposed to infection. That method now stood discredited by its results. The fourth method was that of compulsory slaughter of the entire herd—both the affected and those that had been exposed to infection. He unhesitatingly expressed his belief that this plan, if put into operation, would in a short time, and at a trifling cost, as compared with the accumulated annual loss from pleuro-pneumonia, stamp out this disease just as effectually as it had stamped out rinderpest and sheep-pox.

He repeated what he had frequently before stated, that in his opinion it was not a question of suppression but of prevention, and that they would never eradicate pleuro-pneumonia from the country by inoculation, other and more radical measures must be put in force; and as to the failure of the Netherlands Government to get rid of it by inoculation, being attributable to faults in the method of operating, he could only say that if the father of inoculation in European countries, viz.: Willems, of Hasselt, failed in suppressing the disease, with all the power of the Government at his back and with the full control and supervision of the practice, no individual or body of individuals in this or any other country were likely to be successful in that direction. If they were sincerely desirous of ridding the country of this scourge they should not advise the adoption of half measures, and if there is at the outset some sacrifice in the adoption of radical measures, the loss would be a hundred times repaid by the freedom which would be restored to trade in cattle, both at home and for exportation.

Professor Williams, in winding up the discussion, thought inoculation had done a great deal of good. He was not prepared, however, to give a decided opinion till some large experiment had been made at the public expense.

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PROGRESS OF VETERINARY SCIENCE.

Iron-weed as a Cause of Abortion.—Some years ago, a physician living in the lower part of our city, submitted to me for determination a root fragment which he said was used in the circle of his practice in a rural district as a domestic emenagogue. Not recognizing the root, he afterwards brought to me a portion of the stem and leaves of a plant which proved to belong to the common iron-weed, *vernonia noveboracensis*, growing abundantly in the meadows. It has occurred to me that if this plant has the quality attributed to it, that when cut among hay and fed to cattle, it may be one of the causes of abortion among cows.

Joseph Leidy.

Medicine as Practiced by Animals.—Wm. O'Neill, M. D., of Lincoln, in England, relates the following in a letter addressed to the *British Medical Journal* dated February 15th, 1883.

A young cat which was born blind, and which shows extraordinary acts of instinct, amounting almost to reasoning intelligence, began to suffer from epileptiform fits, and abscesses of the face in the summer of the past year. From the age of three or four months, the animal could go all over the house and garden nearly as well as if she had her sight. So long as pieces of furniture were in their usual places, she rarely, even in her playful gambols, knocked herself against any of them; but several times, when chairs and tables were displaced, she has hit her head with great force against them, and on one occasion her head came into violent collision with a mowing machine. The fits and abscesses were, therefore, sufficiently accounted for by the injuries which the cat received. An abscess, which recurred every ten or twelve days, formed on the right cheek, and usually opened under the right eye and into the nostrils. At the outset, the matter discharged was pus, but afterwards blood escaped with the pus, and sometimes blood, without any appreciable quantity of pus, escaped by the same openings. The fits, which gradually increased in violence and frequency, were not much under the control of bromide of potassium.

The great amiability of temper the poor animal displayed during her sufferings, which occasionally must have been very severe, was remarkable. She could hardly be induced to take any food with the exception of a little cream; consequently she soon wasted away to mere skin and bone. The bowels were generally constipated for days at a time, and her breath had a most unbearable fœtid odor.

I may mention, too, that the poor animal became intensely dropsical, the abdomen becoming distended almost like an inflated bladder. Her heart could be seen to beat violently on her making the slightest exertion, and on several occasions she coughed up quantities of blood. She breathed through the open mouth, owing to the nostrils being blocked up with tenacious matter, which she from time to time endeavored to discharged by violent sneezings.

The animal's treatment of herself was very simple, but as far as it went was, I think, fairly good. She lay in a basket made warm and comfortable, which she rarely left, excepting to crawl to the fireplace in order to procure well-burned cinders, which she ate with avidity. This being observed, willow charcoal was procured, and daily put in a place accessible to her. At first she rather disliked the willow charcoal, but soon she became fond of it. To milk she seemed to have a great repugnance; nevertheless, milk was the means she used to act on her bowels. For days the bowels would not act; then all at once she would begin to lap milk in quantities, which fluid never failed to operate on her bowels in less than an hour. The disliked milk then was the means the cat used to keep the bowels open, and the charcoal was the remedy which she employed in order, in all probability, to correct the fœtid state of the breath, and the emanations from the decomposing secretions of the mouth and nose, and perhaps also to allay some uneasy sensations in her stomach. When the disease had been going on for two or three months, the idea of giving her sulphide of calcium, for the recurrent suppuration, struck me. She was therefore given about a quarter of a grain of the medicine three or four times a day. On the suppuration the calcium acted slowly and surely; but on the dropsy, which had existed for some months, it acted like a charm, for in a few weeks the water disappeared without leaving a trace. In fact, all the formidable symptoms rapidly passed away, the suppuration being the last to disappear, owing doubtless to some disease of the bones of the face.

The cat is now a beautiful animal, fat and with a fine white fur, and as playful as a kitten. It had been often said by those who saw the animal when in the height of her illness, that it was cruelty not to destroy her. Her recovery is, however, most instructive, not only on account of the means which she herself used, but more especially on account of the favorable effects the sulphide of calcium had on the dropsy.

THE ROYAL (DICK) VETERINARY COLLEGE.

Owing to the steady increase in the number of students attending this institution during recent years, and to the extension and development of the methods of teaching, both hospital and class-room accommodation has gradually become inadequate. Three years ago the trustees reconstructed a section of the College property, which had previously been let as dwelling-houses, and converted it into class-rooms. This afforded a temporary relief, but it soon became evident that nothing short of a complete reconstruction of the then existing premises would suffice to provide the requisite accommodation. The plan of the remodelled premises was prepared from an outline of the teaching requirements supplied by the professors of the College. It is intended that the new premises will, in respect of completeness and adaptation for teaching, occupy a foremost place among similar institutions. The main entrance to the new buildings is, as before, in the form of an archway, opening off Clyde Street. The ground floor to the left of the entrance comprises the Principal's office and waiting-rooms, while to the right of the entrance a house is provided for the janitor. The second story on this site consists of the museum, which communicates with the pathological department at its west extremity, and with the anatomical rooms on the east. Over the museum are placed pathological and physiological laboratories and class-rooms for practical chemistry and practical microscope work, in connection with the classes of physiology and pathology. On the east side the ground floor is occupied mainly by stalls and loose boxes, but it comprises also a pharmacy room and an operation room. The remaining buildings on this side are devoted to the anatomical department, and comprise the dissecting room, a lecture theater, macerating room, professors' private work room, etc. The dissecting room is a very spacious apartment, after the design of the new dissecting room in the Edinburgh University. It is lit entirely from the north and is provided along one side with a gallery for the display of preserved preparations. A hoist will bring up the dissection subjects from the ground floor, and mechanical appliances will be provided for transporting them with ease to any part of the room. The floor of this room is of asphalt, and it is intended to coat the walls with enamel paint. The anatomical lecture theater is seated for 150 students, and is in communication on either side with the dissecting room and with the museum. Entire subjects can thus be brought in from the dissecting room in order to illustrate the lectures and for the same purpose there will be every facility for utilizing preserved preparations from the museum. The buildings on the north extremity comprise on the ground floor a shoeing forge, and hospital accommodation in the shape of dog kennels, stalls and loose boxes. Over this, and forming the second story, are a library and a gymnasium for the use of students; while the upper story on this side forms part of a suite of rooms devoted to the chemical department. On the west side the entire ground floor is occupied by stalls and loose boxes, and over these are placed part of the suite of chemical rooms, a general lecture theater, seated for 200 students, professors' private rooms, etc. The central court, from which access is obtained by staircases to the various departments, is to be entirely roofed with glass and a gallery will extend along one side of the court at the level of the first floor. The staircase at the north end of the court, which fronts the main entrance, will have the lower part in the form of an arcade, in the central niche of which will be placed the memorial statue of Professor Dick, the founder of the institution.

PHARMACEUTICALS FOR VETERINARY PRACTICE.—During the recent meeting of the Veterinary and Sanitary Association at Chicago, a very handsome display of preparations especially adapted for veterinary practice was presented by Parke, Davis & Co. It is significant of the progress that veterinary medicine is making, that such large purveyors of drugs should establish especial facilities for supplying the demands of veterinarians, not only the more commonly used preparations in convenient form, but the practitioner's special prescriptions in gelatine-coated balls which are compact and durable.

MECHANICAL HORSE-SHOEING.

The progress and improvements that have taken place during the past few years in the method of treating horses, with a view to the cure and amelioration of the various ailments with which they are affected, have been commensurately equal in importance to the innovations and advancements made in the medical and surgical treatment of human beings.

One of the most important is the patent hoof expander, invented by Dr. Roberge, and for which the Judges at the last American Institute Fair gave him the high honor of the Special Medal of Silver, which is only given, according to the constitution of the institute, to productions of rare merit and extraordinary usefulness.

REVIEWS.

El colera en Valencia en 1885. Memoria acerca de los trabajos realizados durante la epidemia. * * * * presentada en nombre de La Junta Municipal de Sanidad. 8° Valencia. Imprenta de Manuel Alufre. 1886.

[Cholera in Valencia in 1885. A report upon the epidemic, etc., presented in the name of the Municipal Board of Health.]

The report before us is bound with paper, and besides 180 royal octavo pages, contains an appendix with numerous tabulated statements showing the course of the disease in its various aspects. At the end there are also plans of a cholera hospital erected in the suburbs in 1885, a good map of the city upon which the locations of the deaths from cholera are indicated, and an excellent chart by which the movement of the epidemic, both as to attacks and deaths, is graphically compared with the variations of the atmosphere, including changes in pressure, temperature, humidity, rainfall, etc.

The report, exclusive of the statistical portion, is divided into three parts, viz: clinical, hygienic, and administrative. In the clinical portion such subjects, as topography and geology, clinical history of the attacks, development of the epidemic and anticholeric inoculations, are discussed more or less fully.

The report states that "The facts observed in Valencia demonstrate in a very evident manner the non-transmissibility of cholera by air, except possibly at extremely short distances and in the midst of a very intense focus of infection.

"Transmission within the foci appears to be effected rather by contaminated clothing than by other means. In the first 150 cases, the foci were formed by importation, and in none of these first cases did the disease spread to the neighboring houses or even to the other rooms of the same house. Whenever the disease leaped to another house, it could always be proven that the person attacked therein had been in direct contact with the sick or had removed contaminated clothing to places in which the disease developed."

The reporters are of the opinion that the epidemic in Valencia also showed water to be a medium for spreading cholera, especially the water of sluggish and narrow streams:

"The irrigation canals performed the office of carrier (of the contagium of cholera), and in the interior of the city the sewers with a slow current contributed to the transmission and spread of the epidemic."

The reporters appear to accepted the doctrines of Koch concerning the etiology of cholera, but at the same time they collected some facts which cause them to admit also, with Pettenkofer, that there is a close relation between the level of the surface water and the outbreak of an epidemic.

They caused chemical and bacteriological examinations to be frequently made of the public water supply and of the water in private wells. Only in the latter was the presence of the comma bacillus recognized.

Altogether, this report is a credit not only to the members of the Board of Health of Valencia, but also to the municipality and to the printer, for it indicates a knowledge of modern medicine quite up with the times, it reflects the energy and public spirit which have made its publication possible, and superior typography leaves nothing to be desired. Moreover, it constitutes a valuable contribution to the history of the last epidemic of cholera in Europe. E. O. S.

VADE MECUM OF EQUINE ANATOMY, by A. Liautard. Second edition revised, New York, 1886. Published by Wm. R. Jenkins.

This useful little volume appears in better type and paper, a great convenience for rapid reading. With revision of the first edition, professor Liautard has added a table of muscular relations. It serves its place well, for rapid review of the student's studies, or for refreshing the memory in a moment of need. H.

THE EQUINE HOSPITAL PRESCRIBER, by James B. and Albert Gresswell, London, 1886. Baillière, Tindall & Cox.

If this almanac collection of receipts have, as the authors claim, nearly all "proved to be of great value," we sincerely hope that those who are unable to formulate their own mode of treatment may derive great success in the treatment of "aneurysm, anguia pectoris, bots, diabetes mellitus, farcy, lampas, stringhalt," etc. We doubt if the book is of much value to others. H.

BOOKS AND PAMPHLETS RECEIVED.

CONTAGIOUS AND PARASITIC DISEASES OF ANIMALS. Published by the State Board of Health, Maine.

Preventable disease circulars, including typhoid and scarlet fever, diphtheria and small-pox. They will be furnished by applying to A. G. Young, M. D.. Secretary, Augusta, Maine.

PROFESSOR WALLEY'S ADDRESS AT THE OPENING OF THE 63d WINTER SESSION, Royal Veterinary College, Edinburgh.

CONSTITUTION AND BY-LAWS OF THE MISSOURI STATE ASSOCIATION OF VETERINARY SCIENCE AND COMPARATIVE MEDICINE.

STUDIES FROM THE BIOLOGICAL LABORATORY, John Hopkins University, edited by H. Newell Martin, M.D., and W. K. Brooks, Ph. D. Vol. III., No. 8.

TRANSACTIONS OF THE AMERICAN DERMATOLOGICAL ASSOCIATION, 1886.

IS ELECTROLYSIS A FAILURE IN THE TREATMENT OF URETHIAL STRUCTURES, by Robert Newman, M.D., New York.

CASES IN ORTHOPÆDIC SURGERY, by Ap. Morgan Vance, M.D., Louisville.

LARYNGOLOGY AND ITS COGNATE BRANCHES IN AMERICA, AND THE SIMPLEST AND MOST EFFICIENT TREATMENT OF DIPTHERIA, by W. H. Daly, M.D., Pittsburg.

OSTEOLOGICAL NOTE UPON THE YOUNG OF GEOCOCCYX CALIFORNIANUS AND A SKULL OF A NAVAJO CHILD, by R. W. Shufeldt, M.D., U. S. A.

By Prof. B. G. Wilder, NOTES ON THE BRAIN, THE COLLOCATION OF A SUTURE AND FISSURE IN THE HUMAN FŒTUS.

HUMAN CEREBRAL FISSURES, THEIR RELATIONS AND NAMES AND THE METHOD OF STUDYING THEM.

THE PAROCCIPITAL FISSURE,

By Prof. T. Wesley Mills, INNERVATION OF THE HEART OF THE SLIDER TERRAPIN, *Pseudemys Rugosa.*

THE RHYTHM AND INNERVATION OF THE HEART OF THE SEA TURTLE.

THE HEART OF THE FISH COMPARED WITH THAT OF MENOBRANCHUS WITH SPECIAL REFERENCE TO REFLEX INHIBITION AND INDEPENDENT CARDIAC RHYTHM.

THE PHYSICIANS' VISITING LIST, for 1887, Philadelphia, 1886, P. Blakiston, Son & Co.

LEVYTYPE CO. PHILA.

JEAN BAPTISTE AUGUSTE CHAUVEAU.

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ORIGINAL COMMUNICATIONS.

ART. IX. ORGANIC DISEASES OF THE ŒSOPHAGUS

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In considering the organic diseases of that most important organ, the œsophagus, it is necessary to devote a brief space to the consideration of its *functional derangements.* Fortunately these are only two, viz: *loss of power* and *excess of power.*

(1) *Loss of Power.*—Paralysis of œsophagus, or œsophageal akinesis, may be *temporary* or *permanent;* the former resulting usually from exhaustion in attempts to propel onwards an abnormal collection of ingesta or to regurgitate an unusually large cud; to muscular injury, or to temporary nervous paralysis; the latter being associated with and due to important organic changes in the nerves or the muscular tissue.

Muscular injury, producing temporary paralysis, is usually inflicted in the act of swallowing sharp and unyielding objects; by the exercise of unnecessary violence in the passing of the probang; by the malicious introduction of sticks into the œsophagus (the pharynx usually being involved, in these cases); and by injuries inflicted from without.

Nerve derangement may be the result of some central or peripheral derangement of the tenth nerve, or to actual section of that nerve in such operations as phlebotomy.

It is manifest that a prolongation or extension of the above mentioned causes, will, in the long run, produce permanent paralysis; but there are frequently other influences, both nervous and muscular, in operation to produce this result. The nervous influences, are, undoubtedly, paralysis of the pneumogastric nerve, whether proceeding from central (brain) lesions or from peripheral influences, and atrophy of that nerve. The muscular influences are, atony of the muscular fibres, as the result of inherent imperfections of nutrition or imperfect nerve-supply; and atrophy produced by fatty degeneration consequent upon inflammation.

While recognizing, theoretically, the above causes as being in operation to produce œsophageal paralysis, it must be acknowledged that it is sometimes difficult to reconcile theory with clinical facts. It is a recognized law, that when nerve-force is withdrawn from muscular structure the latter undergoes important organic changes in the direction of fatty transformation and atrophy, and yet we occasionally meet with instances (as in Corbet and Pringle's case, hereafter to be related) in which we have undoubted evidence of nerve-deficiency coupled with increased muscular development, and associated with œsophageal akinesis.

Œsophageal paralysis, if persistent, is inevitably accompanied by œsophageal dysphagia, and by a marked tendency to impaction, followed by dilatation of the tube, and that, usually, along its whole length. While dysphagia is a marked symptom, there is not, except in the case of actual wounds, any evidence of pain, either on the application of external pressure, by the introduction of the probang, or in attempts to swallow; neither is spasm produced by any of these influences.

Therapeutic Indications.—If the paralysis is due to temporary causes, it will be succeeded by restoration of function on the removal or subsidence thereof; consequently, active treatment is not called for; regulation of diet with the avoidance of any irritating influences is all that is demanded. If, however, good grounds exist for the supposition that organic nerve or muscular change is in progress, more active therapeutic measures are required. These consist in the use both externally and internally of nerve and nervo-muscular stimulants. Of the former, no agent is comparable with strychnine (though physostigmine may be employed in the more recent cases where there is a tendency to impaction), of the latter, the application of the Actual Cautery over the Cervical portion of the œsophagus, or the employment of galvanism are the most effectual. Stimulating embrocations and even blisters may be tried in the early stages.

In all cases, due attention must be paid to feeding and watering, and on no account should the animal be allowed to get hungry or thirsty, as in its endeavors to satisfy the cravings of hunger and thirst, choking (impaction) is frequently produced and the existing lesion thereby materially aggravated.

Spasm (Exalted Function, Hyperkinesis) of œsophagus, "*Œsophagismus*," "*Dysphagia Spastica.*" Spasmodic contraction of the muscular walls of the œsophagus may be excited in any animal; it is most common and most easily produced in the horse. As an accompaniment of hysteria it is of common occurrence in the human female, in whom, owing to a sensation of a ball in the throat, it constitutes "Globus Hystericus," and from the fact of its producing temporary occlusion it has been designated *temporary, or spasmodic stricture.*

Causes.—While spasm is usually excited by the lodgment of foreign matter, as in the condition known as choking, and is a necessary accompaniment of vomiting and eructation, it not infrequently arises in the horse without the intervention of any such apparent cause, and can only be attributed to some peripheral or central irritation of the pneumogastric nerves. *Symptoms* are always most pronounced, and often distressing, in the horse.

The spasm when of idiopathic origin, is intermittent, and though usually excited by the act of swallowing, especially cold water, it not infrequently occurs while the animal is quiescent. On the advent of the spasmodic contraction, the nose of the sufferer is suddenly protruded, the neck is drawn downwards and backwards, and sometimes curved laterally; the ears are fixed, either in a backward or forward direction, and the œsophagus is observed, on the left side of the neck, to shorten itself and to roll up in the form of a hard or unyielding mass. In the horse, a scream may be emitted. There is, usually, no cough, neither is there any pain evinced on the application of pressure; there is no salivation or constitutional disturbance. If the spasm persists, it may lead to the production of organic disease.

Treatment.—Hand rubbing and hot fomentations, followed by the application of stimulating anodyne liniment. Belladonna or subcutaneous injections of atropine, conia, or morphia, with the internal administration of one or more of these agents. Hard or irritating foods should be avoided as should, also, very cold water; and the animal should be fed and watered sparingly but often.

INFLAMMATION OF THE ŒSOPHAGUS.

Œsophagitis is seldom, or never seen in the domestic animals as an idiopathic affection.

Traumatically, it is produced by lacerations inflicted by the passage of sharp or hard roots or foreign bodies; by violence in the use of the probang, by the malicious thrusting of sticks down the throat, and by external injuries—in all these cases the inflammation is circumscribed.

Acute Catarrhal Inflammation, is frequently produced by the action of corrosive agents, as strong acids and alkalies and very hot water—nitrate of potash is probably the only agent of a non-corrosive character capable of inducing acute œsophagitis.

Catarrhal croupous or a diphtheritic inflammation occasionally occur as an extension from the fauces and pharynx, and some of the worst cases of the two latter forms I have ever seen have occurred in the ox and the pig. Catarrhal sometimes results from extension from the stomach.

Interstitial Inflammation, may be the result of extension from the mucous membrane in mucositis; more largely it is induced by injury.

The cardiac extremity of the œsophagus is, in the horse, frequently (much more so than is imagined by most practitioners) the seat of interstitial changes, the walls of the tube in many instances becoming enormously thickened for a distance of several inches and its lumen diminished to the diameter of a crow's quill. It is undoubtedly secondary, in many cases, to interstitial gastritis and arises as an extension thereof.

Indications are, Œsophageal Dysphagia, indeed, indifference to the taking of food is usually the first symptom manifested; pain is evinced on the application of external pressure and on the administration of irritant medicines. Tumefaction of the organ may or may not be present; the nose is usually protruded in order to remove the pressure. Diagnosis is sometimes facilitated by the history of the case, and where the lesion is suspected, it should be carefully enquired into.

The Therapeutic Indications are, to prevent gastro-intestinal complications by the administration of laxative medicines; to reduce the inflammatory action as quickly as possible by the administration of sedatives—tincture of aconite and nitrate of potash *par excellence;* and by the external application of fomentations with belladonna or opium liniments, or arnica lotion; and after the subsidence of the inflammation, a counter irritant over the cervical portion of the organ. Careful dieting both during the existence of the process and subsequently, is imperatively demanded.

Sequelæ.—Œsophagitis, no matter how produced, is of greater gravity in its results than in its immediate effects, as it may act as an exciting cause to the development of such malignant affections as carcinoma, sarcoma and tuberculosis.

Catarrhal or other forms of œsophageal mucositis may be followed by ulceration which in its turn may produce by contraction in the healing process, stricture. Acute inflammation may, and sometimes does, induce fatty changes in the muscular walls thus predisposing to dysphagia and dilatation; while interstitial inflammation is a frequent cause of constriction.

ABSCESS

May be a result of acute phlegmonous inflammation; it is more largely produced, however, by direct mechanical injury, and when arising in the thoracic portion of the tube is a very grave lesion as its contents may be evacuated into the thorax, in which case, acute pleurisy and death inevitably result. In the cervical region the contents of the abscess may be evacuated externally, and if suppuration has resulted from direct injury from within, as from the penetration of a foreign body or from a wound inflicted by the probang, it will certainly be followed by œsophageal fistula. Evacuation of the contents of the abscess into the lumen of the tube is the most desirable termination, but even in the event of this taking place, sacculation—or one form of it—is to be dreaded. The signs of the formation of œsophageal abscess are those of acute disease of the tube from any cause, and if situated in the cervical region the usual indications of the process are manifested externally.

Therapeutic indications are similar to those of œsophagitis; in all cases where the abscess is situated in the cervical section of the tube the pus should be evacuated, surgically, immediately its presence is diagnosed; and the use of the exploring needle will enable the practitioner to do this at a tolerably early period of its formation. The longer pus is imprisoned, the greater will be the destruction of tissue and the greater the probability that grave sequelæ as stricture, sacculation, or fistula will arise.

RUPTURE AND LACERATION OF THE ŒSOPHAGUS.

Rupture may be *partial* or *complete*; it can scarcely be produced by such indirect violence as vomiting, so long as the organ is structurally healthy, nor does the impaction of foreign bodies lead to such a result under ordinary circumstances. The lesion is, as a rule, produced by violence in the removal of foreign bodies, especially where these are of an angular formation or present salient or sharp points of projection. Laceration from without may occur in any animal, but wounds inflicted in the above mentioned manner are most frequently met with in cattle. Very exceptionally, rupture is produced by the spasmodic contraction of the œsophagus upon the probang, in its withdrawal, when that instrument is used for the displacement of foreign bodies. The indications of the occurrence of rupture during the act of dislodging foreign bodies are, shrinking of the animal—probably groaning or, in cattle, bellowing—when force is applied with the probang, and on the withdrawal of the instrument it is usually found smeared with blood.

The subsequent general indications are, inappetence, arrest of rumination in ruminants; gastric tympany, great prostration and depression; salivation, moaning and gnashing of the teeth, in cattle and sheep, with rapid and irritable pulse and more or less febrile disturbance.

The local indications are, in the cervical region—heat, tenderness and swelling along the course of the œsophagus with (especially in cattle) diffuse emphysema, this condition being produced by the infiltration of gas regurgitated from the stomach. If the foreign body has been forced through the tube, it may, in the cervical region be detected under the skin by manipulation. If the injury is located in the thoracic section of the tube, chest symptoms of obscure character will be manifested. In either case the cautious passage of the probang will determine the existence and site of the injury, signs of pain being immediately evidenced when the extremity of the instrument comes in contact with the damaged tissues.

Surgical Indications.—If the injury is localized in the neck and the foreign body can be detected it should be removed by means of an external incision with as little delay as possible, and the injured œsophagus freely exposed; after the removal of the object, all foreign matter should be carefully removed and the edges of the wound closely approximated with aseptisized silk sutures. No solid food of any kind should be allowed for a period of ten or twelve days, and even then very cautiously and when there is reason to suppose that the wound has healed a small probang should be passed two or three times a day; subsequently probangs of a gradually increased size should be used—by this means stricture may be avoided.

If the injury is located in the chest, palliative treatment can alone be adopted. Practically nothing more than the exercise of great care in dieting can be done.

Results.—Solution of continuity of the walls of the œsophagus, even though of slight extent, is always a grave lesion. If partial, ingesta will become insinuated between the coats of the organ, and, acting as an irritant, set up acute inflammation followed by suppuration and the formation of an abscess; or it will lead to the production of stricture.

If the rupture is complete, the foreign body escapes into the tissues surrounding the tube, and in its thoracic portion may pass into the chest, or if situated at that portion of the œsophagus contacting with the root of the lungs, it may be lodged in the connective and mediastinal tissue of the part and be followed by an abscess. If thoracic rupture is complete, ingesta and water find their way into the chest and establish a fatal pleurisy.

FISTULA OF ŒSOPHAGUS

Is, fortunately, seldom seen in veterinary practice, and more frequently in cattle than in any other class of animals.

Causes.—1st. Perforating ulcer, no matter how originating.

2d. The destructive processes associated with and consequent upon such malignant diseases as cancer and sarcoma.

3d. Penetrating wounds inflicted by foreign bodies from within, or, accidentally or otherwise, from without.

4th. The formation of an abscess in close proximity to the œsophagus; the pressure exerted by it causing absorption of the walls of the tube and the contents subsequently gaining exit externally.

The worst case of this kind which has come under my notice occurred in a colt, under the care of Mr. Campbell, of Kirkcudbright.

5th. Rupture of the œsophagus in attempts to dislodge foreign bodies, the object being forced through the walls of the tube, there acting as an irritant, inducing the formation of an abscess, and being evacuated with the pus, or removed surgically. A case of this kind came under my observation many years ago, while a pupil with Mr. Kettle.

6th. Fistula is one of the most unpleasant and most dreaded results of œsophagotomy, inasmuch as a wound in the œsophagus is kept patent for an indefinite period by the constant passage of solid or fluid matter when attempts are made to swallow.

Fate, probably, has no more miserable existence in store for an unfortunate animal than that of œsophageal fistula; perpetually hungry ingestion cannot satisfy it, as the greater part of that which it swallows does not reach the stomach but escapes by the fistulous opening.

I have already indicated that the majority of cases of œsophageal fistula result from the surgical removal of foreign bodies, this arises from the fact that attempts are usually made to remove these bodies *en masse*, instead of adopting the slower but safer method of removing them piecemeal. Given a tuber, *e g.*

potato, or a portion of a root, as of a turnip, it is surely better to make a small incision directly over it, and by the aid of a gouge break down the obstructing object and remove it in small particles than to boldly cut through the walls of the œsophagus and remove it bodily. The latter may be the more brilliant, the former is certainly the safer operation, and its results are more satisfactory; and even assuming that the obstructing body partakes of the nature of a bone or similar object, its dimensions can be diminished by the aid of a pair of bone forceps and its removal effected without leaving such a gaping wound as that which results from the ordinary method of bodily removal.

The treatment of Fistula, if the orifice is at all large, is very unsatisfactory and in the great majority of cases attempts to effect a cure are defeated; nevertheless, cases sometimes occur in practice where it is desirable that every means should be employed in order to gain the coveted result—a cure.

In Recent Wounds the divided tissues should be approximated, under antiseptic precautions, with double strands of silk, care being observed to include the mucous membrane in the suture, but it should not be allowed to lie between the edges of the wound in the muscular coat; in other respects the treatment already recommended for rupture should be carried out.

In Old Cases of Fistula, with Callous Boundaries, the fistulous orifice should be converted into a new wound by free scarification of its edges with a gouge, or removal of the walls of the sinus by an elliptical-shaped incision, subsequently proceeding as in the case of a recent fistula or wound.

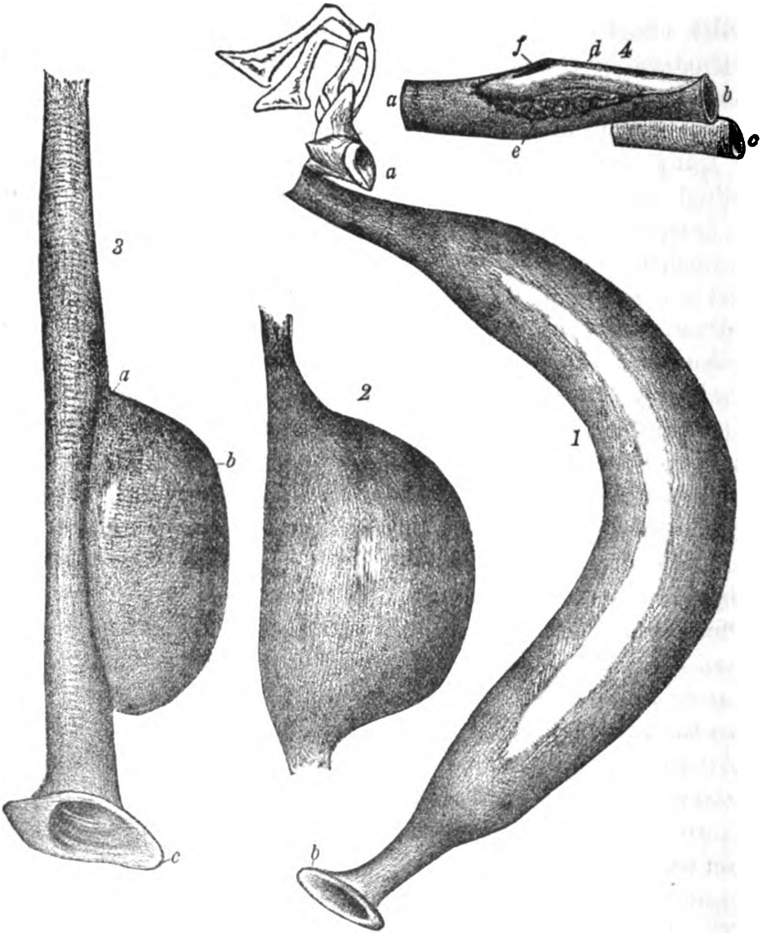
Attempts to obliterate the opening by the use of the actual cautery plaster, or similar appliances, are, as a rule, failures, though plaster may be brought into requisition as an adjunct to sutures.

MALIGNANT DISEASE OF ŒSOPHAGUS.

The diseases of this class which have come under my notice are tuberculosis, sarcoma and cancer.

Tuberculosis of this organ is rarely seen as the result of natural infection, and not often as a secondary disease; it has been produced, secondarily to pharyngeal disease, in young calves by feeding with tuberculous products.

The two latter conditions are more common, though, fortunately for the sufferers, they too are of comparatively rare occurrence. I have only seen one or two cases in the horse, of secondary origin to faucal and pharyngeal disease, and altogether four or five in cattle.



*(1) Diffuse dilatation of Œsophagus of horse (Messrs. Corbet & Pringle's case.) *a*, pharyngeal; *b*, cardiac extremity, length, 5 ft. 3 inches; greatest circumference, 13 inches—in dried condition.

(2) Circumscribed dilatation of Œsophagus of cow. (Mr. R. Rutherford's case, in Dick V. College Museum.)

(3) Sacculation of Œsophagus. (T. W.) *a*, line of lacerated and cicatrized muscular coat; *b*, sacculated mucous membrane; *c*, cardiac orifice.

(4) Œsophagus of heifer. (Major Heywood's.—T. W.) Showing Sarcoma of the organ, with separation and laceration of its mucous membrane. *a*, pharyngeal; *b*, gastric extremity; *c*, portion of Posterior Aorta; *d*, mucous separated from muscular coat; *e*, showing the jagged and irregular condition of œsophageal wall produced by the destructive (carcinomatous) processes; *f*, aperture in membranous portion produced by probang.

One of the worst cases, though it was more circumscribed than others I have seen, occurred many years ago, when I was practicing in North Wales, in a two years old heifer of the Montgomeryshire smoky-faced breed; and in this case the diseased processes led to so much attenuation of the mucous membrane as to cause it to yield to the pressure of a probang which I had passed with the view of assisting in the diagnosis. The conditions produced by the destructive processes in this case are depicted in Fig. 4.

Unless originating as an extension of disease from the pharynx, the mucous membrane withstands the destructive effects of malignant disease, such as cancer or sarcoma, for a considerable period.

THE INDICATIONS OF MALIGNANT DISEASE

are not always diagnostic; they are as follows: œsophygeal dysphagia, arrest of ingesta at a certain point, voracious or morbid appetite, marked gastro-intestinal derangement as shown by tympany (more or less persistent), irregularity of the bowels and frequent attempts at vomition; emaciation and general unthriftiness of the body, and death from inanition. In all suspected cases of this kind, the probang should be cautiously passed and the site of the disease localized; and in those cases in which the mucous membrane is engaged in the diseased process the extremity of the probang, on withdrawal, should be examined for evidence of debris; if any be present it should be microscopically examined in order to determine its character.

In the cervical region, external confirmatory evidence may be obtained by careful manipulation. *Treatment* of such cases is, from their nature, hopeless; palliative measures may be adopted, but even if the disease could be arrested, stricture would almost certainly result.

On microscopical examination, *post-mortem*, it will usually be found that the tissues around and adjacent to the œsophagus are involved in the destructive process; particularly is this the case with the bronchial lymphatic glands, when the disease is localized in their immediate proximity. I have in one or two instances thought that the disease had primarily originated in these organs.

STRICTURE OF ŒSOPHAGUS may be localized in any part of the tube; in the horse, as already indicated, its seat is usually in the cardiac extremity.

The Causes.—May be *intrinsic* or *extrinsic*. In the former class we have thickening of the œsophageal walls, as the result of inflammation—especially interstitial—abscess, malignant disease, contraction of the cicatrix in the healing process of wounds or ulcers, and the formation of polypi—the last mentioned being of very rare occurrence.

In the latter class of cases, we have the pressure exerted by external growths adjacent to the œsophagus, enlarged bronchial lymphatic glands, constriction by contraction of pleural adhesions in the thorax, invagination between the tracheal rings, and disease of the diaphragmatic structures around the foramen sinistrum.

Stricture may be *partial* or *complete*. It may, or may not, be associated with dilatation. In chronic cases this complication is inevitable as the repeated lodgment of ingesta at the point of obstruction causes the walls of the œsophagus to yield gradually to the eccentric pressure exerted upon them.

The Indications of Stricture depend upon the extent to which the lumen of the tube is occluded, and also upon the age of the lesion. They are œsophageal dysphagia with impaction, these conditions being most observable when the sufferer is allowed to eat or drink *ad lib.*, after a period of fasting.

It is of the utmost importance to distinguish between this lesion and pharyngeal obstruction, or dysphagia. In the former, the symptoms do not make their appearance until the food or water has reached the point of obstruction, and a great part of the œsophagus anterior thereto becomes distended with the solid or fluid matter. In the latter they appear immediately the animal endeavors to swallow. Glutting and rejection of food or water by the nostrils, in the horse (the mouth, and *probably* nostrils also, in other animals,) taking place at once, whereas in œsophageal stricture some little time elapses before pronounced symptoms are observed, and as these will be considered fully in speaking of dilatation, they need not be further considered here.

Whenever stricture is suspected its site and extent should be accurately localized by carefully passing the probang, and in doing this, recent may, as a rule, be readily differentiated from chronic, by the facility with which the introduction of the instrument is effected, and by the presence or absence of blood stains on the end of the probang when it is withdrawn. The difficulty of introducing the instrument is greatest in chronic cases; while in recent, blood stains are in the majority of instances observed.

Stricture, like fistula, leads ultimately to extreme emaciation and produces death by inanition.

Indications as to Treatment.—1st, to give only such foods as are easy of deglutition; 2d, to carefully regulate the dieting so as to avoid hunger; 3d, to endeavour to overcome the stricture by the judicious use of bougies of gradually increasing sizes. If there are indications of great interstitial thickening, potassic iodide may be administered internally, and if the stricture is localized in the cervical region, iodine may be applied immediately over its seat, or injected under the skin.

DILATATION OF ŒSOPHAGUS.

Œsophagus Ventricosus.—Dilatation may be *diffuse*, or *circumscribed.* Diffuse dilatation may, and sometimes does, extend the whole length of the organ and its lumen may be enormously enlarged. In the œsophagus depicted in Fig. 1, the greatest circumference is, in its dried condition, 13 inches; the length 5 feet 3 inches. This specimen was forwarded to me by Messrs Corbett and Pringle, from New Castle-on-Tyne, some years ago; it was removed by them from the carcass of a 3-year old cart horse. Circumscribed dilatation does not usually involve more than a few inches of the tube; one of the worst cases I have seen, except in association with malignant disease, being that shown in Fig. 2, the specimen, removed from a cow, was placed in the collection of the College Museum by Mr. Richard Rutherford.

Dilatation may, and does take place independently of stricture (as in Messrs C. and P's case), but stricture cannot, as a rule, exist long without producing dilatation. A remarkable exception to this rule is seen in the case of stricture of the cardiac extremity (alluded to above) in the horse, and I have repeatedly seen this in dissection subjects and when making *post mortem* examinations.

Other complications of dilatation are: A. *Paralysis of the laryngeal muscles*; as in C. and P.'s case, the larynx and tenth nerve showing all the conditions usually observed in roarers. B. Organic disease as cancer, sarcoma, tuberculosis or ulceration.

The walls of the tube may be much attenuated and pale in color; on the contrary the muscular coat may be greatly hypertrophied and of a very florid hue—such was the case in the œsophagus depicted in Fig. 1. When the hypertrophy is due to the formation of new interstitial matter, the organ is pale in color. Organic changes in the mucous membrane are seldom seen in simple dilatation.

The causes of simple dilatation are: 1st. Atrophy of the muscular wall with or without fatty degeneration as a sequel of inflammation; or deprivation of nerve force as a result of injury to, or paralysis of, the pneumogastric nerve. 2d. Atony and attenuation of the muscular wall.

Dilatation resulting from stricture is due to continual accumulation of food in front of the constricted portion of the tube.

The Symptoms of Simple Dilatation are, as a rule, much less pronounced than are those of dilatation with stricture; they are usually evidenced, in the case of the horse, when the animal is put in the stable after work (fasting) and allowed to drink water *ad lib.*, or to eat at will of bran mash or other similar food; and are excited by the temporary *impaction* of food produced by inability on the part of the weakened œsophagus to force it onward. They are best observed when the cervical portion is engaged in the lesion, the animal showing the symptoms already described in speaking of spasm, and on examining the left side of the neck the distension is at once detected, as are also the movements in the tube, produced by the spasmodic efforts of the muscular coat to propel the contents towards the stomach.

If water is arrested in its progress, fluctuation can be distinctly felt, and on auscultation a gurgling sound is heard;

this sound assists the practitioner to detect the condition in the thoracic portion of the œsophagus.

When water alone has been swallowed the symptoms pass off in the course of a few minutes, and the same holds good in the case of temporary lodgment of succulent mashes, but if the animal is very hungry and continues to devour voraciously such food as chaff, half or moistened bran or grass, the *impaction* becomes so great as to induce symptoms of extreme distress—particularly in the horse. The symptoms usually presented under these circumstances in the horse are salivation —often very profuse; paroxysmal spasm associated with squealing; sometimes lying down and rising again immediately, or going down partially or wholly on knees; perspiration more or less profuse; oppressed pulse, throbbing of the carotid arteries and turgescence of the superficial veins notably of the jugulars; great difficulty in breathing, accompanied by cough, usually paroxysmal in character; regurgitation of ingesta through the nostrils and eructation of gas and if the impacted matter has lain for long in the tube the ejected matter is alkaline in re-action instead of acid as in the case of vomition. Tympany sometimes slight, at others so pronounced as to cause great distress and threatened suffocation.

If relief is not afforded, death may ensue from exhaustion, or from asphyxia. The latter may be produced by the pressure of the gas in the distended bowels; by the pressure of the impacted matter on the trachea; or, by the passing solid or fluid material into the trachea and bronchial tubes. In Messrs. Corbet and Pringle's case, the œsophagus was simply packed with fresh grass, and a tolerable quantity of grass and water was found in the trachea and bronchia. This animal had been purchased at Newcastle Fair on the day prior to his death, travelled some little distance into the country, and placed on luxuriant pasture for the night; he was found dead the following morning.

In cattle, the symptoms of dilatation, and of dilatation with impaction, are much less marked than in the horse, and any material that may be ejected is passed through the mouth as well as through the nostrils. The dog succeeds much more readily in expelling impacted matter, and consequently obtains relief more easily than do other animals.

In reference to the general condition of an animal suffering from dilatation, I have seen horses, even in the worst cases, looking the picture of health, and capable of doing their share of work without manifesting signs of distress or exhaustion; but in chronic cases we usually have emaciation and unthriftiness, and great debility, with marked irregularity of the bowels; and in milch cows, partial or total arrest of the secretion of milk.

In complicated dilatation, *e. g.*, when associated with stricture, the symptoms above described are materially aggravated, and their duration prolonged.

Treatment of Simple Dilatation.—In no case should an animal the subject of this lesion, be allowed to go for any length of time without food or water; in the stable, in fact, the horse should have a permanent supply of water, and food should be given in small quantities and often. Hay is sometimes swallowed with greater facility than are softer and more succulent foods.

If the dilatation seems to be due to nerve paralysis, nerve stimulants should be administered and a strong stimulant, or even the flat-iron applied along the whole course of the cervical section of the tube. Strychnia may be injected subcutaneously, or galvanism may be had recourse to. In dilatation with stricture it is obvious that no permanent good can be effected by treatment unless the stricture is overcome.

When impaction takes place, all available means should be employed to remove the accumulated matter with as little delay as possible. The longer the condition continues, the firmer the mass becomes, and the greater is the difficulty experienced in dislodging it.

If ejection of portions of the impacted matter is being effected by the animal itself, the process should be encouraged by the careful administration of linseed oil or other lubricant, and by breaking the mass down, when the impaction is localized in the cervical region, by careful kneading applied externally. If the lodged matter is of a fluid character, it may be withdrawn by the aid of an aspirator or the trocar and canula; if semi-solid, water may be injected directly into the mass by an irrigating syringe. In no case should the probang be brought into requisition in dealing with solid or semi-solid material, unless the bulb is of small dimensions, as attempts to dislodge the mass by the aid of an ordinary probang only lead to its firmer impaction.

If tympany is so great as to cause distress, and interferes with respiration, it should be at once relieved by paracentesis, and if congestion of the lungs with oppressed action of the heart exist, mustard plasters or ammonia liniment should be applied to the chest, and blood, in moderately large quantity, abstracted from the jugular vein.

If the above measures fail in affording relief, œsophagotomy (when the impaction is in the cervical portion of the tube) should be performed as a *dernier resort*, but instead of cutting boldly down into the mass by a large incision, a small opening only should be made, and the mass dislodged by the aid of water injected with a double action syphon or syringe, assisted by a small blunt hook. In very bad cases an opening may be made at either extremity of the impacted mass and water injected from above downwards. Any subsequent contraction in the healing of the wounds will be useful. The plan here recommended may be put into execution in ordinary cases of impaction of the œsophagus with semi-solid or solid matter. Tracheotomy should be performed where there is imminent danger of suffocation taking place and the seat of impaction permits of the operation.

SACCULATION AND POUCHING OF THE ŒSOPHAGUS.

Œsophageal Diverticulum.—Sacculation differs from dilatation in the important fact that there is solution of continuity of the structure of one of the coats, and while pouching is strictly a form of sacculation, the term should properly be confined to those cases in which there is an aperture through both coats communicating with the lumen of the tube and also with an extra œsophageal pouch formed in the tissues around the organ.

Sacculation of the mucous membrane, *complete sacculation,* is usually caused by laceration of the muscular coat by the passage of unyielding bodies, as by extreme pressure exerted with the probang in the act of unchoking, the muscular, on account of its firmer texture, yielding before the mucous coat.

Sacculation of the muscular coat, *incomplete sacculation*, is usually caused by laceration of the mucous coat by sharp foreign bodies or improperly constructed probangs, and by destruction of the mucous coat by ulceration or the action of corrosive agents.

Pouching is usually caused by the formation of an abscess adjacent to the œsophagus, or by the destructive process of sarcoma or cancer, or by complete laceration of its coats; in abscess the coats are destroyed by the suppurative process and the contents of the abscess discharged into the tube, the walls of the abscess forming the pouch; in the latter case ingested matter finds its way into the surrounding tissues, acts as an irritant and produces suppuration, but ultimately a distinct sac or pouch is formed as a result of interstitial growth.

The aperture of communication in complete sacculation may be a mere slit; on the contrary, it may be a wide open mouth, and the sac itself may become so large as to form a kind of cæcal appendage to the œsophagus. This condition is well shown in Fig. 3.

No matter how originating, the size of the sac or pouch, owing to the constant passing into it of ingested matters, is liable to increase, and it will always be largest in those parts where the least support is afforded by surrounding tissues or organs.

One of the most remarkable cases of pouching that it has been my lot to witness occurred in the practice of Mr. Walters, of Newport, Salop.

The subject was a cow, and the case came under the notice of Mr. Bampfield Kettle, of Market Drayton, while acting as *locum tenens* for Mr. Walters. The site of the pouching was opposite the root of the lungs, and the pouch was of at least two quarts capacity. It bore evidence of having been in existence for a considerable period, and it had evidently acted the part of a diverticulum, and a constant interchange of ingesta had been going on between it and the œsophagus.

The Indications of Sacculation and Pouching are tolerably distinct when the lesion is situated in the cervical portion of the œsophagus, but very indefinite when localized in the thoracic portion. In the former case, an intermittent tumor, or globular shaped swelling, will be readily detected by the eye and hand, its consistence and character varying with the character of its contents, *i. e.*, whether fluid, semi-fluid or solid. Except in the early stages of its formation, or in the event of inflammatory action being set up from any cause, there is neither heat, pain, nor tenderness, and the general condition of the patient may be good. On the contrary, the animal may be unthrifty and emaciated. When situated in the thorax, the general symptoms are similar to those observed in dilatation with stricture, and differentiation of the two conditions is scarcely possible.

Impaction may take place in the same manner as in dilatation, but unlike that condition, there is a great probability of suppurative inflammation being induced by the prolonged retention of ingesta. The general indications as to treatment, are, on the whole, similar to those of dilatation, but when the lesion is localized in the neck, some benefit may accrue from the application of a compress and bandage, or from the application of strips of adhesive plaster crosswise over the sac. Alternatively, repeated blisters may be applied, or iodine injected subcutaneously with the object of establishing a formative inflammatory process, and by thus increasing the quantity of interstitial tissue round the sac, affording a certain amount of support to it. Care, however, in dieting and watering is of more importance than is the direct application of any particular method of active treatment.

The legal aspect of chronic œsophageal disorders may be dealt with in a few words.—Whenever it can be shown that any organic lesion of the œsophagus has been in existence prior to purchase, and the animal, be it of what species it may, was warranted sound, the warrantor is most certainly liable for damages, even though a considerable period may have elapsed after the date of sale.

Art. X.—ANASARCA.

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SYNOMYMS: Purpura Hæmorrhagica, Scarlatina, Diarrhæmia (Williams), Diastaéshæmia (Delafond), Fiévre Petechiale, Blutfleckenkrankheit, Mal de tete de contagion, Morbus Macalosus.

BIBLIOGRAPHY. TRASBOT, WILLIAMS, DIECKERHOFF, ROBERTSON, BRUCKMULLER, ETC.

DEFINITION.

Anasarca, derived from two Greek words—ἀνά, around, and σαρξ, flesh—is strictly an œdema or dropsy of the tissues, an infiltration of serum into the spaces of the connective tissue. It occurs in two forms, essential and symptomatic; the latter is not due to any primary lesion of the tissue affected, but is produced by obstruction in some distant part, to the current of blood, as in some of the heart diseases, tumors, pregnancy, etc., which mechanically increases the pressure in the veins and causes the serous exudation in the part. This form is purely local and will get well spontaneously if the cause can be removed.

Essential Anasarca is a much more serious trouble. It gives rise to lesions so varied in appearance, while identical in their anatomical alterations, it is rendered grave by such extensive and fatal complications and in it, the constitutional phenomena are so unequal in different cases, that the pathology has been variously interpreted and frequently misunderstood. Some authors from certain of the predisposing causes and from the frequent complications of this disease by septicæmia have placed it among the putrid fevers and have considered that it is, at least an infectious, if not a contagious disease. Others, from the appearance of some of the lesions, have made it an eruptive fever and class it as a contagious trouble.

Essential Anasarca, or simply Anasarca, as this term indicates the most frequent lesion without prejudicing in any way, as to the causes of this disease, may be defined as a vaso-motor paralysis, attended by exudation of serum in the connective tissue spaces, either subcutaneous, interstitial or submucous; the exudation frequently accompanied by rupture of the capillaries and extravasation of blood, which at a later period produces constitutional phenomena or fever. The fever is merely the result of the local irritation produced by the lesions and absorption of the exudation.

ETIOLOGY.

Anasarca is confined almost exclusively to the horse and mule, more rare in the latter, but has been seen in the ox and in man. Among the predisposing causes, are cold and wet climates, damp, rainy weather, improperly drained stables, cold and damp from want of ventilation, previous disease of a debilitating character, such as exhaustive pneumonias, pleurisy, severe strangles and influenza. The last disease is the indirect cause, as frequently as all the others combined. The predisposing debility may be the result of bad hygienic conditions, starvation, improper food, overwork and exhaustion. Whatever may have been the origin of the debility and anæmia which is at times present, it is seen generally in animals which have been of unusual force before the predisposing trouble weakened their constitutions. It is seen in the large, heavy draught horses of sanguinary temperament, good feeders, plethoric, strong, active horses of medium size, and but rarely in the fine, clean, dry tissues of the thoroughbred. The cause is usually exposure to cold, rain, snow-storms, draft of air on a heated, but not necessarily a sweating animal. (Fedoré, an Italian physician, mentions a case occurring in a grenadier, who plunged into one of the cold lakes of Northern Italy, after a long march.) In resumé, the etiology is found in a weakened vaso-motor system, which when acted upon by an accidental irritant, is overtaxed, then relaxes and is unable to regain its power over the distended capillaries.

SYMPTOMS.

The symptoms are excessively variable. The local lesions may be confined to a small portion of the animal's body and the constitutional phenomena be nul. The appearance and gravity of the local lesions may be so unlike, from difference of location, that they seem to belong to a separate disease, and complications may completely mask the original trouble.

PERIOD OF INVASION.

In the simplest form the first symptom noticed is a swelling or several swellings occurring on the surface of the body, on the fore-arm, the leg, the under surface of the belly, or on the side of the head. The tumefaction is at first the size of a hen's egg; not hot, little sensitive and distinctly circumscribed by a marked line from the surrounding healthy tissue. These tumors gradually extend until they coalesce, and in a few hours have swelled up the legs, legs and belly, or the head to an enormous size; they have always the characteristic constricted border, which looks as if it had been tied by a cord. In the nostrils are found small reddish spots or petechiæ, which gradually assume a brownish and frequently a black color. Examination of the mouth will frequently reveal similar lesions on the surface of the tongue, along the lingual gutter and on the frænum. If the external swelling has been on the head, the petechiæ of the mucous membrane are apt to be more numerous and to coalesce into patches of larger size, than when the dropsy is confined to the legs. The animals may be rendered stiff by the swelling of the leg, or be annoyed by the awkward swollen head, which at times may be so enormous as to resemble that of a hippopotamus, rather than that of a horse. During this period, the temperature rem ins normal, the pulse, if altered at all, is only a little weaker, the respiration is only hurried if the swelling of the head infringes on the calibre of the nostrils. The appetite remains normal. The animal is attentive to all that is going on and, except for the swelling, apparently in perfect health.

STADIUM.

In from two to four days, the tissues can no longer resist the pressure of the exuded fluid. Over the surface of the skin which covers the dropsy, we find a slight serous sweating, which loosens the epidermis and dries, so as to simulate the eruption of some cutaneous disease. If this is excessive, we may see irritated spots which are suppurating. In the nasal fossæ, the hæmorrhagic spots have acted as irritants, and inviting an increased amount of blood to the Schneiderian membrane, produce a coryza or even a catarrh. We may now find some enlargement and peripheral œdema of the lymphatic glands, which are fed from the affected part. The thermometer indicates a slight rise in the body temperature, while the pulse and respiration are somewhat accelerated. The appetite usually remains good. In the course of a few days the temperature may have reached 39° C. or 39.5°, or 40° C. (104° Fahrenheit.)

Fever is established, not an essential or specific fever in any way, but a simple secondary fever produced by the dead material from the surface or superficial suppuration, and by the oxydization and absorption of the colloid mass contained in the tissue. Just such a fever as would be produced by an excoriation of a considerable surface of the skin in an animal, otherwise sound, or by the absorption of the œdema resulting from a blow.

COMPLICATIONS.

Suppuration may become excessive from the great distension and loss of vitality of the skin. Here the lesion is visible and the constitutional phenomena are marked.

Lymphangitis may be established from the large amount of irritating material which the ducts and glands of the lymphatic system are forced to carry from the affected part.

Gangrene may be developed in spots from the size of a pea to that of a hen's egg. The great distension of the subcutaneous layer of connective tissue or the excessive hæmorrhage in the submucous layer may completely destroy the vitality of the part, and brown and then black masses of a slough appear, to eliminated, and leave a deep rosy ulcer in their place. This is more common in the nose and under the tongue.

Excessive Swelling of the Head.—The swelling of the head may increase and extend outside to the throat, or to the nostrils, until the latter are closed, or to the larynx, which is so pressed upon as to render respiration difficult or impossible. The same complication renders mastication and deglutition equally difficult.

Metastasis.—This is a frequently dreaded complication. If the trouble has originally been in the legs and belly, it may suddenly commence to appear in the head, and disappear from the part first affected, or the opposite more favorable change sometimes occurs, the dangerous swelling of the head disappearing to attack the belly or legs.

Enteric Œdema.—The effusion on the exterior may take another course and pass to the intestine, causing symptoms of colic, which either ends fatally or more rarely terminates by a profuse diarrhœa, which is sometimes hæmorrhagic in character.

Pulmonary Œdema.—Marked dyspnœa without swelling of the head, is indicative of metastasis into the parenchyma of the lungs, which will rapidly show dullness on percussion and tubular murmurs on auscultation. The tumefaction leaves the exterior and attacks the lungs and the animal dies of asphyxia.

Septicæmia.—There is certainly no disease in veterinary practice which offers a more favorable field for the development of septicæmia. The large mass of colloid matter held at the temperature of the animal body, could not be surpassed in the gelatine tube of a bacteriological laboratory, as a nutriment for the putrefactive ferments. Septicæmia is ushered in by general rigor, sudden elevation of temperature and marked symptoms of coma.

TERMINATIONS.

Resolution.—The simple form of the disease most frequently terminates favorably on the eighth to tenth day by absorption of the effusion, with usually a profuse diuresis and with or without diarrhœa. The appetite remains good or is at times capricious. The surface of the body is dirty from desquamated epithelium, and at times there is complete loss of hair, giving the appearance of a bad case of sarcoptic mange. At other times the absorption is slow, lasting for some weeks with tendency to relapses. Again there may be left some permanent induration the result of embryonic growth.

Death.—Death may occur from *mechanical asphyxia*, produced by closure of the nostrils or closure of the glottis. Metastasis to the lungs is almost invariably fatal, causing death by asphyxia. Metastasis to the intestines may cause death from pain, enteritis or hæmorrhage.

Excessive Suppuration, *Lymphangitis*, and *Gangrene* are causes of a fatal termination by exhaustion. Mortal exhaustion is again produced by inability to swallow in cases of excessive swelling of the head.

Peritonitis may arise secondary to the enteric œdema or by perforation of the stomach or intestines by a gangrenous spot.

Septicæmia terminates fatally with its usual train of symptoms.

ANATOMICAL ALTERATIONS.

The essential alterations of anasarca are exceedingly simple; the capillaries are dilated, the lymphatic spaces between the fibres of the connective tissue are filled with serum, and the coagulable portion of the blood, presents a yellowish or citrine mass, jelly-like in consistency, which has spread out the tissue like the meshes of a sponge. Where the effusion has occurred between the muscles, as in the head, these are found dissected and separated from each other, like those of a hog's head by the masses of fat. The surface of the skin is desquamated and frequently denuded of the hair; frequently there are traces of suppuration and of ulceration. The mucous membrane of the nose is found studded with small hæmorrhagic spots, sometimes red, more frequently brown or black, often coalesced with each other in irregular sized patches and surrounded by a reddish zone, the product of irritation. If œdema of the intestines has occurred, the membrane is found four or five times its normal thickness, reddish in color, with hæmorrhages on the free surface. Œdema of the lungs leaves these organs distended. On section a yellowish fluid runs out, like from lungs which have been filled with water in the dissecting room. The secondary alterations vary according to the complications. There are frequently the lesions of asphyxia, externally we find ulcers, abscesses and gangrenous spots and the deep ulcers resulting from the latter. The lymphatic cords and glands are found with all the lesions of lymphangitis. Again are found the traces of excessive emaciation, or the lesions of septicæmia. Except from the complications the blood is not altered in anasarca. If previous to the attack the animal had ænemia, the tissues will be infiltrated and the pallor and other appearances of ænemia will be found. If prior to the attack the animal is in moderate health, with unaltered blood, the blood will be found to clot with the typical change of the buffy coat of the horse. In death by asphyxia the blood will be found fluid, black in color but gradually turn red, and clot on exposure to the air. Dickerhoff mentions fibrinous pneumonia among the alterations. I myself have never seen it occur.

DIAGNOSIS

must principally be made from farcy-glanders. In anasarca the swelling is non-sensitive, while sensitive in the acute swelling of farcy. The nodes of farcy are distinct and hard and never circumscribed as in the other disease. The eruption of glanders on the mucous membrane is nodular, hard and pellet-like. The redness disappears on pressure. The petechiæ of anasarca are not elevated, are due to extravasated blood and do not change color on pressure. In cases of excessive swelling of the head in anasarca there may occur an extensive sero-fibrinous exudation from the mucous membrane of the nose, poured out as a semi-fluid mass or as a cast of the nasal fossæ, never having the appearance or typical oily character which it has in glanders. The inflammation of the lymphatic cords and glands in anasarca does not produce the hard indurated character, which is found in farcy.

Septicæmia may have occurred primarily or as a complication of anasarca. The diagnosis must be made from the history, and the prognosis is of little import.

PROGNOSIS.

While this is not an excessively fatal disease the prognosis must always be guarded. The majority of cases run a simple course and terminate favorably at the end of eight or ten days or possibly after one or two relapses, requiring several weeks for complete recovery. Effusion into the head renders the prognosis much more grave, from the possible danger of mechanical asphyxia. Threatened mechanical asphyxia is especially dangerous on account of the risk of blood-poisoning after an operation of tracheotomy.

Metastasis to the viscera or from the legs to the head is a most serious complication, while metastasis from the head or other portions to the belly and legs, is favorable, as removing, for the moment at least, all the danger of immediate death. The prognosis is otherwise based on the complications, their extent and their individual gravity, existing, as they do here, in an already debilitated subject.

TREATMENT.

The treatment of anasarca may have to be as variable, as are the lesions. The indications are at once shown by the alterations, and mechanism of the disease, which we have just studied. They are:

1st. Regulation of the disordered circulation of the blood and strengthening of the vaso-motor system.

2d. Promotion of absorption of the colloid mass, which has infiltrated the tissues. This of course is based upon oxydization in order to metamorphose the exudation into absorbable crystalloids.

3d. Prevention of metastasis, which is the most frequent fatal termination of this trouble; if not directly by œdema of the lung or enteritis, indirectly by further weakening the already debilitated system.

4th. The immediate treatment of the complications, each *per se*; asphyxia and gangrene being the two which most frequently call for active interference.

These indications call for constitutional and local remedies.

CONSTITUTION TREATMENT.

Blood letting would at first seem totally contra-indicated, but in certain cases it acts like a charm. Debilitated as the animal usually is when attacked by anasarca, we have yet seen that one of the great predisposing causes is the plethoric habit. The current of blood, like a swollen river after a spring storm, can be thrown from its usual course by the slightest side channel. The use of bleeding requires the acute perception of the practitioner to be put upon the alert to regulate it. Not only the present condition, but the previous state of health, and the probable future hygienic and medical care must be taken into consideration. Given a case that will admit of bleeding, the quantity to be taken is always a minimum one, and it is to be regulated by the quality of blood that is found.

With the weakened walls of the vessels but a little lessening of the pressure will produce a vacuum, when compared with the condition found in an ordinary blood vessel system, with normal elastic walls. Bleeding is only permissable at the outset of the disease, when the tumors are still isolated. When the tumefaction has coalesced, all the blood is required to oxydize the mass of effused colloid matter.

Hygiene now comes into play as the most important factor. Oats, oat and hay tea, milk, eggs, anything which the stomach or rectum can be coaxed to take care of, must be employed to to give the nutriment which is the only thing which will permanently strengthen the tissues, and they must be strengthened in order to keep the capillaries to a proper calibre.

Laxatives, diaphoretics and diuretics must be used to stimulate the emunctories so that they shall carry off the large amount of the products of decomposition, which result from the stagnated effusions of anasarca. Of these the sulphate of soda in small repeated doses, the nitrate of potash and bicarbonate of soda in small quantity, and the chlorate of potash in single large doses, will be found useful. Williams cites the chlorate of potash as an anti-putrid, it is useful but I believe because it frees oxygen—and oxygen is a chemical purifier.

Stimulants and astringents are directly indicated. The animal wants wakening up, everything in it wants a shock, and a belt to hold it in place. Spirits of turpentine serves the double purpose of a cardiac stimulant and a powerful warm diuretic; for the kidneys in this disease will stand a wonderful amount of work. Camphor can be used with advantage. Coffee and tea are two of the diffusible stimulants which are too much neglected in veterinary medicine; both are valuable adjuncts in treatment in anasarca, as they are during convalescence, at the end of any grave disease, which has tended to render the patient anæmic. Dilute sulphuric acid and hydrochloric acid are perhaps the best examples of a combination of stimulant, astringent and tonic which can be employed. The simple astringents of mineral origin, sulphates of iron, copper, etc., are useful as digestive tonics ; I doubt if they have any constitutional effect. The vegetable astringents, tannic acid, etc., have not proved efficacious in my hands. Iodide of potash in small doses serves the triple purpose of digestive tonic, denutritive for inflammation and diuretic.

Externally—sponging the swollen parts, especially the head, when the swelling occurs here, is most useful. The bath should be at an extreme of temperature—either ice water, to constrict the tissues, or hot water, to act as an emollient and to favor circulation. Vinegar may be added as an astringent. When we have excessively denuded surfaces, suppuration or open wounds, disinfectants should be added to the wash.

In cases of excessive swelling, especially of the head, mechanical relief may be required. Punctures of the part should be made with the hot iron even in country practice, as no other disease so predisposes to septic contamination. When mechanical asphyxia is threatened, tracheotomy may be demanded. Here, again, the hot iron should be used, and disinfectant applications should be constantly applied. With the first evidence of dyspnœa, not due to closing of the nostrils or glottis, or with the first pawing which gives rise to a suspicion of colic, a mustard plaster should be applied over the whole belly and thorax. The sinapism will draw the current of the circulation to the exterior, the metastasis to the lungs or intestines is prevented, and the enfeebled, nervous system is stimulated to renewed vigor by the peripheral irritation ; the organs are encouraged by it to renewed functional activity ; the local inflammation produced by it favors absorption of the exudation. The objection to the use of blisters is their more severe action and the danger of mortification. Septicæmia, when occurring as a complication, requires the ordinary treatment for the putrid diseases, with little hope of a good result.

In termination, anamese is misunderstood; etiology is debility; symptoms are mechanical effusions; sequelæ are inflammatory products of irritation; pathology is the result of symptoms and sequelæ; treatment is indicated by etiology, *i. e.*, tonics and stimulants.

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ART. XI.—ELASTICITY AS A CONSERVATIVE FORCE IN THE ANIMAL ORGANISM.

BY T. WESLEY MILLS, M. A., M. D.,
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Elasticity is a conservative property even in unorganized and inanimate bodies; but in living organisms it plays a part the importance of which amid the strains and complexities of existence we may guess at, but cannot adequately estimate.

The elasticity of the tissues gives the youthful form their firmer set, greater capacity to resist the effects of strains, falls, etc., adds to the beauty of form, and probably has much to do with high spirits. While all the tissues are more or less elastic, there is every degree of variation.

The elasticity of muscle is especially important and has been most carefully studied. The fact that this property is perfect up to a certain point of stretching only—*i. e.* that undue stretching is not followed by elastic recoil is well illustrated in sprained limbs, in which the tendons are not alone injured. A muscle overstretched very slowly recovers its original elasticity. But, important as is elasticity in muscle, it is more so in the tube system of the circulation. It is evident that but for this property there could be no *continuous* flow of the blood, a matter of great moment to a highly organized animal like a mammal. The immediate cause of this constant blood-flow is the elastic recoil of the arteries, which following upon distension in consequence of peripheral arteriole and capillary resistance, expends the force of the heart that had been stored up in the arterial wall during the cardiac systole.

I have been led to write briefly on this subject in consequence of having felt that there is a field in pathology and physiology in which probably most veterinary surgeons might lend assistance to clear up certain questions that arise.

One reads in the newspapers every now and then that at such and such a race-meeting a certain horse suddenly fell dead; the cause of death being stated either as heart disease or "rupture of an artery." Now it is well known that a large proportion of cases of sudden death from heart disease in the human subject, according to popular notions, is really due to other causes; while the bursting of an artery is of the very rarest occurrence, except when the coats are greatly diseased—we may say diseased in a way palpable to naked eye observation. I have not learned that the opinions expressed by the newspapers in the cases referred to among horses were based upon *post-mortem* examinations.

There are several questions to be decided in this connection. If death be due to the bursting of a blood-vessel, what sort of a vessel, vein or artery, large or small? Where is the vessel situated? In brain, lungs, or elsewhere? What the naked eye condition of the vessel concerned? Is the heart sound? Is the structure of the vessel shown on microscopic examination to have been altered? What is the age of the animal? If a vessel can be ruptured in a healthy animal simply by excessive exertion, and that vessel, by the closest examination of its structure, shows no changes the eye can appreciate, is it possible that invisible *molecular* changes of structure may be produced by the treatment of an animal as making up what is called "training," using that term in its widest sense? Can special feeding produce such changes; or if such alterations do really occur, what is it brings them about? The answers to such questions as these seem to me of great importance, scientifically and practically. But the first thing to be ascertained is the actual cause of death in these cases.

The *post-mortem* examination of every race-horse is, from many points of view, of the greatest interest, and the publication of the results in such a Journal as this might be regarded as a valuable donation of knowledge to the entire medical profession. I shall now endeavor to indicate briefly the scientific basis on which the above questions rest—in part at least.

Some years ago a most important investigation, bearing on this subject, was carried out by Dr. Roy, then a physiologist, now professor of pathology at Cambridge, England. The principal conclusions at which he arrived in regard to the elasticity of the arterial wall may be summarized somewhat as follows:

1. The arteries in healthy animals are most distensible with internal pressures such as during life have existed in their interior. The maximum increase of capacity in the case of the aorta and larger arteries is reached with a pressure equal to that corresponding to the normal mean blood-pressure of the animal from which the specimen of arterial wall is taken for investigation.

2. The elasticity of the arteries is much more readily modified by diseases affecting the general nutrition than is generally imagined. Slow febrile processes producing marasmus may completely modify the form of the curve of elasticity. The relations of the pressures to the volumes of portions of the aorta or other large artery from human beings or the lower animals, which have suffered from wasting disease not specially affecting the arteries, is quite different from that which exists in health. When marked marasmus has existed before death the arteries are found to be relatively wider than normal, and are most distensible with internal pressures immediately above zero.

3. The effect of age on the elasticity of the arteries is very marked. Only in young children is the elasticity so perfectly adapted to the organism as in the lower animals; there is a gradual decline with the advance of years in the human subject. But in the lower animals this perfection of elasticity is found in the adult as well as in the young animal. It would appear, however, that while there is not in the circulating system of the young adult man the same capacity for ready adaptability to circumstances as in the child, still the arterial elasticity in the adult is fairly good up to 30 years of age, though not comparable to that of the lower animals.

Dr. Roy has given an account of the examination of the arteries of a dog that had been reduced to a state of extreme emaciation either from chronic illness or starvation. The examination of its vessels showed that the arterial elasticity curve was wholly different from that of healthy dogs. "The artery was more distensible the lower the intra-vascular pressure." And I would myself direct special attention to the fact that in this case *no structural change* of the walls of the vessel could be detected either by the naked eye or by careful microscopic examination of hardened specimens. Hence, the point of some of my queries, stated above, in regard to the race-horse.

When we consider that in the development of a living creature there is a constant adjustment of internal conditions to external environment one would not expect to find that in a healthy animal, rupture of a blood vessel, especially of a large vessel, and above all of an artery, should occur as any possibility of exertion—even the most severe.

It seems, however, to have been shown that the race-horse of the present day has not the stamina of his predecessor. Great speed appears to be now developed at the expense of constitutional vigor. Have the arteries become effected in this process? In the human subject it has been shown that the heart may by affected by long continued athletic strain. Is this true of the race-horse?

The secret of the most healthful and perfect life an animal can enjoy lies in the *balance of all its functions*. The more perfect our physiology, the more complete will be our insight into these relations; and to understand a disease perfectly will be to explain all disturbances of the vital equilibrium.

It would be interesting to ascertain what changes, if any, take place in the elasticity of the arteries of wild animals when kept in confinement. The friends of scientific medicine will note with pleasure that autopsies are held upon the animals dying in the Central Park Menagerie, New York.

If this brief paper serves in any way to awaken increased interest in any question of *scientific* medicine, whether that treated or others, it will have served some purpose.

ART. XII.—ON SOME TÆNIÆ OF THE QUADRUMANA.

BY WILLIAM S. GOTTHEIL, M. D.,
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Through the kindness of Dr. W. A. Conklin I had an opportunity to examine the bodies of several monkeys that died this spring in the Central Park Menagerie. A number of examples of two varieties of tæniæ were found. A careful search of the literature accessible to me in New York did not enable me to refer them positively to any of the described varieties. Beyond the general references in the text-books but one case, that of Studen, was found in the periodical records. Cobbold simply says that old-world monkeys rarely harbor full-grown tape worms—though cysticerci are not rare; and on the other hand that tæniæ are common in monkeys of the new world, but larval cestodes are seldom seen. He mentions *C. tennicollis*, *C. cellulosæ*, *C. pileatus*, *C. crispus*, *Echinococcus multiformis*, and *T. megastoma* and *T. rugosa* as the varieties that have been found. No one of these tæniæ correspond with the varieties figured below.

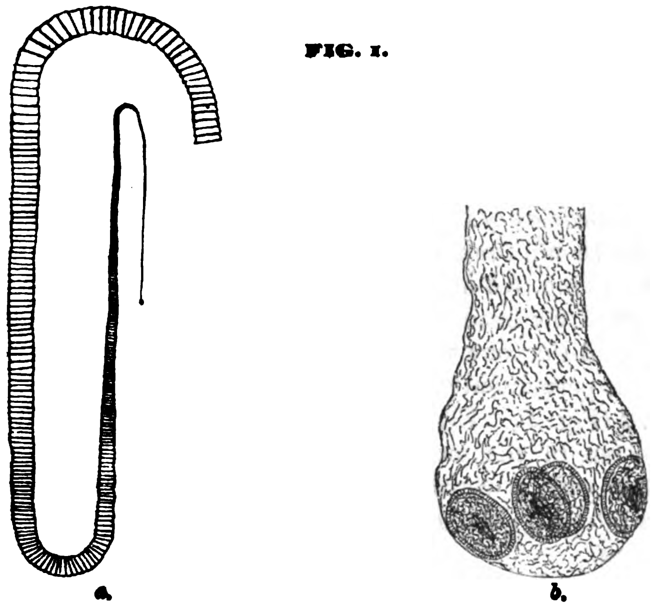
Professor Th. Studen, in the *Miltheilugen der Natur-forschend-Gesellsch-in Berne* for 1879, thus describes a tapeworm, two specimens of which were found in the duodenum of a chimpanzee two years old.

"Length, 100 mm., largest breadth at last segment 15 mm. Scolex small, club-shaped, four suckers, neither rostellum nor hooks. The segments rapidly get large from before backwards, so that the whole is tongued-shaped. Proglottides very short, 1 mm. by 3 mm. broad. Sexual orifices at sides, alternating and wart-shaped; they begin at the end of the first third of the whole. The entire colony was black, pigmented most deeply at the last segment; sexual openings white."

It is to be regretted that no drawing accompanies the account.

Of the tapeworm shown in Fig 1., two specimens were found, together with ten of the second variety, in a female Macaque

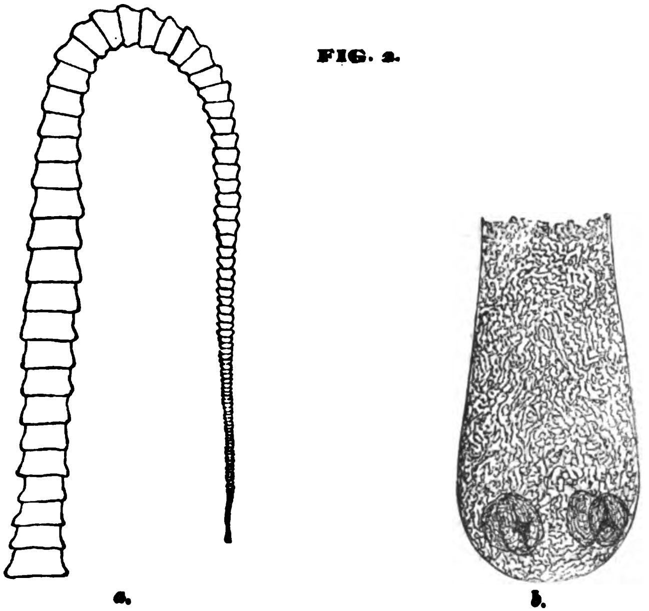
FIG. 1.



A.—Tænia. 1.—Natural size.

***B.*—Head, enlarged.**

FIG. 2.



A.—Tænia. 2.—Natural size

***B.*—Head, enlarged.**

monkey, *Macacus cynomolgus.* The parasitic mass entirely occluded the duodenum, the stomach being full of food, and the intestine below entirely empty.

No. 1 (Fig. 1). Length 20 cm., breadth at largest segment 3.5 mm. Head globular, four suckers, no rostellum, and no hooks. Neck extremely fine and filamentous—2.5 cm. long. Proglottides slowly increase in size, greatest breadth being only attained 15 cm. from head. Sexual orifices at the sides—segments oblong, 3.5 mm. by 0.75 mm. Owing to the extreme delicacy of the head and neck but one specimen was obtained whole, and that one was almost destroyed in the attempt to mount it permanently after the drawing was made.

No. 2 (Fig. 2). Eleven specimens of this tapeworm were found, ten in the monkey previously referred to, and one, together with a considerable quantity of loose proglottides, in the intestines of a male weeping capuchin monkey—*Cebus capucinus.*

Length of largest specimen 15 cm. Breadth at largest segment 8 mm. Head large and clubbed, four suckers, no rostellum or hooks; neck short and thick; proglottides rapidly increase in size after the first inch and attain their full diameter from head, 7.5 cm. mature proglottides. They overlap each other at their posterior angles. Segments mature measure 8 x 4.5 mm.

ART. XIII.—THE VETERINARY SERVICE OF THE UNITED STATES ARMY.

BY R. W. SHUFELDT, M. D., C. M. Z. S., ETC.
Captain, Medical Dept. U. S. Army.

Some fourteen or fifteen years ago I attended the admirable course of lectures upon veterinary medicine and surgery, including the anatomy of the domesticated animals, delivered at Cornell University, by Professor James Law. Since that time I have seen more or less of the methods adopted to care for the sick and disabled horses of the Army. My interest in this matter has also been aroused by articles that have appeared from time to time in The Journal dealing with the various phases of this subject.

A letter which I read in a foreign periodical a week or ten days ago, has induced me to ask your indulgence in the matter of a little space, to add a few words of my own to this very important question.

It will not be my object in this paper, however, to offer any detailed account of the present organization of the veterinary service in our Army, as its status, and its highly unsatisfactory condition, are already too well known to us. As we are aware, our few veterinary surgeons attached to the cavalry regiments are not even commissioned officers; nor is their position as desirable as some of the positions in the non-commissioned staff; nor have they the requisite authority that should pertain to the Army veterinary surgeon; further, their facilities for taking the proper care of sick and disabled government horses are, to say the least of it, simply wretched. In short, the vast majority of the diseased and disabled animals fall into the hands of troop farriers and blacksmiths—men of little or no education, and of no special training in veterinary science whatever.

The former class of men are far too indifferently paid to insure the securing of persons of recognized ability, while the latter should simply constitute the attendants of the department.

It is a rare thing to find a cavalry officer, or an officer of a light battery, who has any *real* knowledge of such subjects, and somehow they seem to fail to appreciate the importance of improving the present state of affairs. Occasionally we will find a medical officer of the army who will *condescend* to go and see an injured government animal, but there are even exceptions to this rule; and one will sometimes say, "No, sir, I consider it far beneath my dignity to know anything of any such subject, I am commissioned for a far higher office." Ah, can it be beneath anyone's "dignity" to be found familiar with any *fact* so long as it represents true knowledge?

I have accepted invitations a number of times during the past ten years from veterinary surgeons of the army to witness operations upon horses, and I must confess that for the most part, the entire scene has usually had the effect of profoundly disturbing my rest for the succeeding night by a hideous night *mare.*

At one of the frontier military posts in Wyoming there was convened, during the summer of 1879, a board of officers to decide what disposition they would recommend to be made of a valuable government horse which had been stricken down in one of the post cavalry stables with idiopathic tetanus. I was present by invitation at the time, and was incidently asked if any thing could be done for the animal, and I recollect giving it as my opinion, that the disease usually proved fatal, but would suggest the trial of removing the patient to a quiet, roomy building, where it could be supplied and protected by a thick bed of straw, and to administer a full dose of aloes, to be followed by belladonna, and then suggested briefly what the subsequent treatment should be. The dose of aloes was administered in my presence, but in the mean time the board had further consulted together, and I saw in a few moments coming in another direction the "subsequent treatment"—a loaded government carbine, calibre 45. This latter instrument is the one most frequently called into use in nearly all severe cases among the horses and mules of our army, and it has one especial advantage—that of covering up a deal of ignorance, to say nothing else.

So far as my experience goes I have never seen a fracture in a government horse that was treated in any other way than by further complicating the case by a fatal gun-shot wound of the head, administered at the recommendation of a "board of survey." The *carbine* is also frequently the sole treatment in many of the other surgical injuries, and in the more obscure diseases.

It will not require figures and facts here, to show that a properly organized veterinary department for the army would be a far wiser, a better and a more economical arrrangement than the present management. Lack of space alone, however, will prevent me from making the necessary comparisons here to demonstrate it.

Were I to draw up a plan for improvement in that direction, it would be something of the following nature:

In the first place it should be organized strictly upon the basis of a staff department, and for its organization it could borrow a great many valuable suggestions from the Medical Department of the Army, and more especially those regulations which have been found to operate to the best ends in actual practice. Right here, however, let me call attention to one fatal error, now in force in the Medical Department, which a veterinary corps should most strenuously avoid, and that is—down through the very lowest subordinate of the department they should, one and all, be actually members of it, and not be obliged thoroughout the service to have men detailed from troops, companies or batteries, to do the duties of the department, duties of which they, in the vast majority of cases, are grossly ignorant.

The veterinary department should consist of a limited number of commissioned officers, a non-commissioned staff, sufficiently large to properly assist in performing the duties pertaining to it, and, finally, a corp of attendants.

Fully as much care should be exercised in the selection of the officers as if they were being chosen for one of the best corps connected with the service. They should be cultured and refined gentlemen in every sense of the word. Further, they should be picked graduates of a limited number of the best recognized veterinary colleges, either of this country, Canada, or Europe. They should have the rank, pay and emoluments of officers of cavalry; they should be subject to promotion within their own department; and they should be allowed the usual increase of pay for length of service. The chief of the department should be a major; there should be three captains, and a requisite number of first and second lieutenants.

Non-commissioned officers, with duties comparable with those of the present class of hospital stewards in the army, could be chosen by a board of veterinary officers, and, if necessary, from the army, provided they could meet the requirements of the board; veterinary attendants could be secured in the same way.

There are a great many valuable men in the army to-day who would make excellent attendants, were they permanently attached to a veterinary department and fell under the jurisdiction of veterinary officers, capable of disciplining and instructing them.

The day is rapidly approaching when an entire regiment of cavalry will be stationed at one point, and these points will naturally be selected for cavalry service, and here will be the localities to establish regimental veterinary hospitals. Troops detached could have a veterinary non-commissioned officer detailed with them, and be subject to periodical visits from a commissioned officer of the department at stated times.

The department should be supplied in much the same way as the medical department is at present, and should, moreover, have the same authority over sick and disabled government animals, as the medical department has over the sick and disabled of the army. In short, after such a veterinary department was once established, it could be conducted pretty much on the same plan as the medical department is at present, and subjected to very much the same kind of regulations.

A small department like this, properly organized and equipped, and in successful operation in peace times, would form an invaluable nucleus upon which to build in times of war. There cannot be too much said in favor of our establishing such nuclei in our military services during these days. But after all, it would be during the long days of peace in the country that the greatest amount of good would accrue from such an establishment.

The class of officers chosen for it that I have suggested would immediately raise the department to a standard that it should occupy, and the mounted arms of the service would at once commence to realize the benefits. Not only would government animals be properly cared for in every particular, but the recruiting of horses and mules could be scientifically attended to by the veterinary department, and thus a far better class of material with greater certainty be secured. Medical and surgical cases, and epidemics could be carefully studied and exhaustively reported upon by the head of the department, incorporating the reports of special cases of individual officers. And these latter coming from the best class of veterinary colleges, would be fully imbued with the great importance of making *comparative* studies in the diseases and injuries among *all* the domesticated animals; they would, too, be inclined to point out the relationship or differences of these diseases, with such diseases as are known to afflict mankind. In fact they would probably be a class of men who would fully recognize what we are just beginning to recognize in these days—and that is to really know what pathology is, and its great scope; we *must* study it in every organized structure that it is known to invade, and then make exhaustive comparative studies of the whole. These officers, too, would probably have a larger share of leisure time upon their hands than their professional brethren in active veterinary practice in the large cities. They could thus inaugurate, when opportunity offered, careful investigations into fatal epidemics among cattle, and sheep, and swine; they would be enabled to make long and careful studies of normal structure, and when serving in certain districts in the west, could more fully develop a *now sadly neglected field*, the morphology and physiology of our United States mammalian fauna. Many of our wild animals in the territories are rapidly being exterminated under our very eyes, and in a few years not only will these important types be forever gone, but we will have the deplorable fact forced upon us, that we have allowed them to disappear and without, in many instances, leaving us, as a legacy, a single line, or a single drawing illustrating their structure.

Following the organization of such a corps as I here propose, not only would the government and the army be well served, but science would also claim her share, and thus humanity at large be well served, and veterinary science in particular would be the gainer; indeed, space will not allow me to fully enumerate the immense advantages that would follow in the wake of such an establishment; and I trust, the day ever arrives when man himself does not constitute the greatest obstacle to his own progress, such a government veterinary corps will duly become a living reality.

ART. XIV.—A FEW NOTES ON SOME OF THE PRINCIPAL CENTERS OF VETERINARY EDUCATION IN ENGLAND AND ON THE CONTINENT.

BY A. W. CLEMENT, V. S.

It is now considered almost a necessary part of a medical student's education to spend a certain time abroad in the furtherance of his studies, under men of world-wide reputation, who have an almost unlimited amount of material at their disposal for teaching purposes.

If in the present limited state of competition, in the veterinary profession, it is not absolutely necessary, it is none the less desirable that the veterinary student should make his education as complete as possible, the more because at present the facilities offered for practical study by the colleges in America are not to be compared with those of the old world.

We shall confine our remarks to a description of the three largest, and therefore, representative colleges of the countries to which they belong, viz.: The London school for England, Ireland and Scotland; the Berlin school for Germany, and the Alfort school for France. Perhaps to the majority of American students the London school alone will have any practical interest, both from the language spoken and on account of the advantages to be gained from the possession of the Royal College diploma. To others, however, who may wish to do some special work, or who wish to compare the work of the leading men in the different countries, a short account of these schools may be of interest.

The winter session at Berlin begins about the first of October and finishes the middle of March; the summer session begins about the first of May and ends the last of July. If one leaves New York about the middle of March, the time when the winter session closes at most of our American schools, he will arrive in Berlin in good time to take advantage of the private courses given at Professor Virchow's laboratory during the spring recess. This laboratory, the pathological institute connected with the Charity hospital, is immediately opposite the veterinary school and affords splendid opportunities for working at pathological anatomy. At the pathological institute connected with the veterinary school will also be found abundant material, though no instruction is given here during the recess. The clinics go on, however, the same as during the session, though the professors may not always be present. Then at the central "viehof," or slaughter house, of course there is as much material at one time as at another, so that one will find enough to do to keep him very busy even during vacation. The pathological teaching at the Charity goes on from seven till ten, seven mornings in the week and includes much instruction in comparative as well as human pathology.

The clinics at the veterinary school begin at ten o'clock and finish at twelve. Two afternoons each week should be devoted to the viehof, where a vast amount of informatian may be gained. All of the animals used for human food in Berlin are slaughtered at this establishment, and every carcass is skillfully inspected before it is allowed to leave the premises; about 150 persons being engaged in the service, 25 of whom are veterinary surgeons. The number of animals consigned daily to the vats shows either that the animals are much more diseased than are ours at home, which is not true, or that we consume a great deal of meat totally unfit for human food, which is true. The pathologist to the institution, Mr. Dunker, is very obliging, and will give one all the assistance necessary. Permission to work here must first be obtained from Dr. Hertwig, chief of the inspection service, but there is no trouble in getting it, as he is a most obliging gentleman. Much original work is done in Mr. Dunker's laboratory, he having first detected the presence of actinomyces in pork. The other afternoons may well be spent at the veterinary school, in the assistants' laboratories, at the pathological institute, or in the clinics, which are held from four till five.

One can hardly form any idea of the immense amount of material at command in almost every branch.

There are four clinics going on at the same time, each in charge of a specialist. There is the medical clinic, the surgical clinic, the smaller animals clinic and the polyclinic. In the surgical wards one may see on an average from 125 to 150 horses as resident patients, and in the medical clinic about the same number; in the polyclinic from 50 to 60 larger animals daily. The smaller animals clinic is divided into two parts, the inner and the outer. In the inner clinic are on an average 75 resident patients, mostly dogs.

I forgot to mention the ambulance clinic, where a certain number of students are taken daily, under charge of a special professor, to visit sick animals at private residences, mostly in the suburbs.

English and American veterinary surgeons complain of college competition, but I don't know what they would say if they were in Berlin. It seems as if everybody must send their sick animals to the college, and I have seen dogs there for a long time, belonging to some of the highest noblemen.

Everything is specialized, and consequently the teaching is the best possible. It is thoroughly practical also, impressions to the contrary notwithstanding. Nowhere, either in veterinary or medical hospitals, is the teaching more systematically carried out from the time the patient enters the hospital until he goes away from there alive, or from the pathological institute in pieces. The daily records of the cases are insisted upon, the diagnosis, treatment and prognosis entered in a special book, and if the animal dies, the post-mortem diagnosis must be made and recorded by the pathologist, who is not supposed to know anything about the clinical diagnosis. The clinical professor takes his class to the post-mortem room and views the organs, pointing out as nearly as possible the relation between the lesions found and the ante-mortem symptoms. On three mornings in the week the pathologist demonstrates the morbid anatomy specimens, and once or twice a week gives instruction in the method of making post-mortems, but in addition to this the students in groups make post-mortems under the direction of the assistants.

About three hundred autopsies are made here yearly upon horses, and I would not like to say how many upon the smaller animals. Much material in the smaller animals goes to waste because the assistants have not time to attend to it.

In the surgical clinic the operations are generally performed by the professor or his assistant, thereby differing from the Alfort school, where the students do nearly everything. Two or three operations a day are the rule. They are very thoroughly performed and the results are sometimes wonderful. Dry dressings are exclusively used, and during the operation the wound is frequently irrigated with corrosive sublimate water. The dry dressings are iodoform and corrosive sublimate with cellulose. A great variety of operations may be seen here. Perhaps they do not cut as much as the French do, but the preliminary work and the dressing is, I think, much better done. As a preliminary to an operation about the foot, as, for example, removal of diseased cartilage and bone, the horse is made to keep his foot in a bath of corrosive sublimate water for at least twelve hours previous to the operation. In France, on the other hand, the horse is thrown down immediately it is decided to operate, and the cutting begins without any further ceremony. The medical clinic in Berlin is very well conducted and so is the smaller animals clinic.

The buildings at the Berlin school are scattered over about thirty acres of land in the center of the city, and, as I said before, opposite the Charity, the largest hospital in the city. With its surroundings it forms a little village within a large city, and it is very pleasant to walk about the well-kept grounds upon a summer's day, quite apart from the busy world without. In one part of the grounds is the veterinary physiological institute, presided over by Professor Monk, who has acquired such a reputation in the localization of brain centers by his experiments on dogs, which he still keeps up. Opposite, the anatomical institute of the university, at the head of which is Waldeyer, probably the leading histologist of the day. Then the hospitals between this and the pathological institute at the other end of the grounds, and Professor Virchow's laboratory, just across the street at the Charity. One must work to see much here, yet the surroundings make a man work, and he will always find plenty ready to help him. If possible, let anybody who intends spending any time in Berlin have some special object in view, for he will find abundant material in almost any class of medicine or surgery.

At the London school the system of teaching is altogether different, but the professors are very enthusiastic and seem never tired of doing all in their power to help the student. They have not the means, however, and therefore can not carry out specialized teaching to such an extent as is done in Berlin; nor do I know that they would if they could, for they seem to have the impression, and not without reason, that a man's influence is better as a teacher when he is a fairly good all-around man, than when he knows something exceedingly well, perhaps at the expense of his general professional information. One thing is certain however, that nowhere will you see as many horses examined for soundness as in London. You can see as many in London in one day sometimes as you can in Berlin in two weeks, or perhaps in a month. The medical clinic in London is also good but there is very little surgery. The professors are not specialists. Each of the three clinical teachers has his day for receiving, and all the cases which come to the infirmary on that day are his cases, be they surgical or medical, large or small animals. If an animal dies and a post-mortem is made, it is done under the direction of the professor who had charge of the case. The material for post-mortems at the college is very limited and for want of time much of it goes to waste; probably this will be remedied before long, as at present they have the will if not the way. If the knackers' establishment, not far away, could be brought into use there would be abundant material for pathological investigation.

The Alfort school, situated about four miles from Paris, offers especial facilities for seeing foot surgery; hardly a day passes but what eight or ten horses are operated upon, and nearly all upon the foot and hock. Most of the horses go away as soon as operated upon, there being accommodations for about 60 only in the infirmary. The clinical teachers do not divide the work here, but as in London each on his day receives all that comes. If a horse is to be operated upon, the operation is performed by the students under the direction of the assistants, except in special cases, when the professor may do the most difficult part. There is no preliminary bath, and tow saturated with tr. iodine is used as dressing, in place of corrosive sublimate. They do not hesitate to go to the bottom of a wound and remove all diseased portions, even if healthy tissue has to be sacrificed. I several times saw the whole sole pulled off, and twice I saw the navicular bone exposed.

The dog hospital is perhaps as large as at Berlin, but not nearly as much attention is paid to it. Large new laboratory buildings have just been erected, but there does not seem to be a great abundance of material. The shoeing forge is very fine, and in this it is ahead of Berlin. Living expenses are about the same in London and Berlin, but in the latter place one needs a first-class stomach to digest the food. In Paris it is much more expensive living.

If I were to do the trip over again and had twelve months at my disposal, I should spend eight in Berlin, three in London and one at Alfort.

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ART. XV.—NOTES ON THE ANATOMY OF THE INDIAN ELEPHANT.

I.—SOME OBSERVATIONS ON THE BRAIN.

BY PROF. HENRY C. CHAPMAN, M. D.,
Jefferson Medical College, Phila.

Though the brain of the elephant has been more or less described, among others by Perrault,[1] Moulins,[2] Blair,[3] Stukeley,[4] Duvernoy,[5] Camper,[6] Cooper,[7] Leuret,[8] the opportunity does not often present itself of examining an elephant's brain in a fresh condition, the following observations, based upon the study of that of the young male elephant that recently died at the Philadelphia Zoological Garden, so far as its softened state permitted, may not appear superfluous. The brain was found to weigh, immediately after removal from the cranial cavity, without the dura mater, which was very thick, 10½ pounds, exceeding in weight any of the brains examined by the anatomists just referred to, the brain of the elephant weighing, according to Perrault, Moulins and Cooper, for example, 9 pounds, 10 pounds, 8 pounds 1 ounce, respectively. While the brain in the elephant is therefore absolutely heavier and larger than that of the grampus (*Delphinus griseus*), weighing 7 pounds, as found by the author, or of the whale (*Balæna mysticetus*), 5 pounds, according to Rudolphi,* or that of man, 49½ ounces, it is relatively to the bulk of the huge beast a small brain, even if the animal be a young one, especially when the great size of the head is taken into consideration. In removing the brain from the skull, the author was much impressed with the size of the cerebellum, which was literally enormous, being about equal in size and weight to one of the hemispheres and entirely uncovered by the latter, its surface being greatly extended through the development of the lateral lobes and very much convoluted through the presence of numerous and deep fissures. This remarkable development of the cerebellum is an interesting confirmation of the view, based upon experiment and pathology, that the cerebellum is the great reflex centre in which afferent impressions are converted into efferent ones by which equilibrium is maintained and muscular actions co-ordinated. Such being the function of the cerebellum, it is obvious why, in the elephant, in which the power of muscular co-ordination is so perfect, that this portion of the encephalon is so much developed. The *pons varolii*, corresponding in size with the development of the lateral lobes of the cerebellum, is especially interesting, as giving apparent origin to the fifth pair of nerves, which, as might be expected, are very large, being developed in proportion to the size of the trunk, or proboscis, which, through their nasal branches, they supply. As regards the medulla oblongata, the large size and prominence of the olivary bodies are especially noticeable. With reference to the hemispheres of the elephant's brain, the most noticeable feature is not only their size, but the extent to which their surface is convoluted, the fissures exceeding in number, depth and complexity even those of the brain of man or of the cetacea, thereby supplementing possibly the deficiency in the gray matter of the cortex arising through the imperfect development of the posterior lobes of the cerebrum, the cerebellum, as already mentioned, being entirely uncovered by the latter. Owing to the softened condition of the hemispheres, due to previous inflammation, and which involved the enormous frontal sinuses as well (to which the irritability of the elephant during life was, no doubt, due), it was found impossible to remove satisfactorily the pia mater, even after the brain had been immersed in zinc chloride solution for several days, and which rendered the identification of the convolutions and fissures both difficult and doubtful. Their general disposition, however, appeared to be about the same as that observed by the author in the elephant brains preserved in the museum of the Jardin des Plantes, Paris, and kindly placed at his disposition for study by Prof. Ponchet. As regards the fissures of the hemispheres, there were two, however, about whose identification there could be no doubt—the fissures of Sylvius and Rolando. Admitting that the well marked fissure descending almost to the fissure of Sylvius, though not reaching it, is homologous with the fissure of Rolando or central fissure of the brain of man, and other primates, chimpanzee orang, &c., then the anterior and posterior convolutions, separated by the same, may be appropriately designated as the anterior and posterior central convolutions, and the four tiers of frontal convolutions passing from the anterior central convolution forward as the superior, middle, inferior, frontal and orbital convolutions.

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[1] Mém pour servir à l'hist des animaux, 3e partie, p. 135. Mem de l'Acad des sciences 1666-1699 t III.

[2] An anatomical account of an elephant, 1682.

[3] Trans. of the Royal Society, vol. 27, vol. 30.

[4] Essay towards the anatomy of an elephant, 1722.

[5] Mem de l'Acad de St. Petersburg, t IV, 1729.

[6] Description d'un elephant, male, 1802.

[7] Referred to in Tiedeman Brain of Negro Phil Trans, vol. 1836.

[8] Anatomie Comparee du Systeme Nerveux, Paris, 1839. Tome, 1, pp. 394, 446.

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* Grundriss der Physiologie Berlin, 1828, Band II, S 12.

Whether these convolutions in the elephant's brain be homologous or not with those of man and ape may be questioned, but there can be but little doubt that they have no homologues in the brains of the lower mammalia, the anterior or frontal lobe being therefore remarkably well developed in the brain of the elephant. As regards the posterior parietal portion of the hemisphere one well marked fissure presented itself and which possibly corresponds to the inter parietal fissure of the human brain. As this portion of the hemisphere was more particularly softened—any fuller identification was impossible. On the mesial surface of the hemisphere the gynes fornicatus and calloso-marginal fissures were well marked. Notwithstanding that the posterior lobes of the hemisphere in this elephant's brain are but little developed, if not absent altogether, the lateral ventricle was very large, extending far forward, and in its depth and width reminding the author of that of the brain of the manatee, with which animal the elephant through the dinotherium has other affinities as well. The thalami optici and corpora striata were well developed, particularly the latter, as also the hippocampus major; the posterior cornu of the lateral ventricle with the hippocampus minor were not, however, observed; the absence of the latter may have been due though to desintegration. From the fact, however, of the cerebellum being entirely uncovered, in all probability the posterior lobe, posterior cornu and hippocampus minor are normally absent in the elephant's brain. It was noticed that the optic lobes while present were small in comparison to the size of the remaining basal ganglia. In concluding this necessarily long notice of the elephant's brain, it will be observed that although the cerebellum is uncovered, that the brain of the elephant is nevertheless of a high order of brain as shown by the development of its frontal lobes and the number, depth and complexity of its convolutions and fissures. This is as might be expected on the supposition that the cerebral hemisphere and the frontal portions of the same more especially constitute the physical substrata of the intellectual powers. Since the intelligence of the elephant from time immemorial has been proverbial, indeed Aristotle[1] among the ancients regarded the elephant as the most intelligent of animals, and while this opinion would not be shared by all naturalists of the present day, many considering the intelligence of the ape, dog, horse and perhaps beaver, as of as high an order as that of the elephant. Never-

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(1) Hist Animalia Lib IX Cap XXXIII.

theless there can be no question that the remarkable mental powers of the elephant are developed proportionately to those of its great brain.

II.—A NOTE ON THE ANATOMY OF THE POSTERIOR EXTREMITY.

BY HARRISON ALLEN, M. D.

The dissection of the muscles of the hind limb of the elephant was undertaken with a special object in view and a full account of the myology was not intended. Since the elaborate descriptions of Miall and Greenwood (Journ. of Anat. and Physiolog. xii and xiii), little is needed in the way of characterization of the muscles for purposes of identification.

It is believed that the features named in the note may have some value, especially so in the account of the structures of the region of the knee.

The muscle named semimembranosus in Maill and Greenwood's dissection was identified as the semitendinosus. It possesses a high origin from the vertebral elements above the sacrum and a low origin from the tuberosity of the ischium as well as a characteristic attachment to the fold between the semimembranosus and the biceps. In addition to these attachments the muscle secures a second origin from the tuberosity at a point in advance of the common origin of the semimembranosus and the biceps.

Since R. J. Anderson (Journ. of Anat. and Physiol. xvii, 491) reports the sartorius muscle absent, it is only necessary to state in this connection that in the specimen dissected the muscle was present and normally disposed.

The biceps muscle is so closely associated with the gluteus maximus that they are undoubtedly parts of the same general sheet. Cuvier and Laurillard describe the larger superficial part as gluteus maximus. The muscle is closely adherent to the femur by stout fibrous tissue. The fascial extension of the biceps toward the ankle was not as pronounced as in M. and G.'s specimen, and the gastrocnemius was not inserted with it on the calcaneum. But such slight variations are to be expected, and the absence of close connection do not invalidate the conclusions drawn as to the essential genetic relation of these two great muscles.

The popliteus is a well defined muscle for the greater part of its length. It arises from the femur 2½ cm. above the outer condyle by a small rounded tendon which lies about in the middle of the epiphysis. The muscle passes downward and inward and is inserted upon the posterior surface of the tibia after the usual manner. The outer half of the muscle is tendinous its entire length. The fleshy fibres do not appear until the capsule of the joint has been passed. The tendon is free on its outer border but is inseparately incorporated with the prosterior capsule on the inner; so that the tendon and the capsule might be called parts of one and the same structure. In like manner the muscle is directly continous with the external interarticular disc and with the posterior crucial ligament. The outer condyle of the tibia is distinctly grooved to accommodate the tendon.

The belly of the muscle is 10 cm. long. The tendon, 12 cm. long and 2 cm. wide. The width of the line of insertion is 14 cm. The tibial groove is 2 cm. wide.

The articular surfaces of the knee joint are remarkable for the cushion-like character of the cartilages. The average thickness of the cartilage may be said to be about 2 cm. and is three times this thickness on the tibia beneath the tendon of the popliteus muscle. The upper border of the inner condyle is marked with a number of raised terete lines which appear to be formed by the pressure of the capsule. The inner condyle is the broader and the more convex. The outer edges are but slightly molded by the discs, the edge of the inner condyle in this respect being the most marked. The opposed borders of the condyles posteriorly are emarginate for the play of the posterior crucial ligament.

The interarticular discs are both rudimental. The outer is scarcely to be distinguished from the enormously thickened posterior capsule. Neither of the discs make any impression on the contour of the joint or are seen from the sides. The posterior surface of the capsule is composed of loosely fasciculated fibres over the inner condyle, but is much firmer over the outer where it ranges from 1 to 2 cm. in thickness.

The tendon of the gastrocnemius just before reaching the calcaneum crosses the tendon of the plantaris and ends with this muscle on the tendon of the soleus 5 cm. above the calcaneum.

The section of the inner head of the muscle resembles that of the internal pterygoid muscle of man.

The tendon is 1½ cm. wide. The distance from the external malleolus to the line of union of the two heads of the muscle is 21 cm.

The soleus arises from the intermuscular septum, between it and the peroneus brevis, and is fused with the deep flexors for the proximal half of the leg.

The place of union of the tibial and the fibular digital flexors is in the sole at a point opposite the cuboid bone where it is grooved for the peroneus longus. The point also corresponds to the proximal limit of the pad on the sole.

The plantaris arises from the femur at a point so intimately associated with the peroneus longus that the two muscles appear to have a common origin, the width of the tendon is less than 1 cm.

The tibialis posticus runs in a groove on the side of the internal malleolus.

The peroneus longus arises from the femur as is so commonly the case with quadrupeds. It is part of the same mass with the peroneus brevis to a point 32 cm. above the external malleolus. The apparent tendon from the place at which it is free from the muscle to the point at which it turns to gain the sole is 1⅔ cm. In the sole it follows the rule in lying in the groove in the cuboid bone. The tendon within the muscle can be traced as far as can the tendons of the extensor communis. The muscle sends a slip, which is 2 cm. wide, to the fifth toe.

The peroneus brevis winds round the posterior surface of the external malleolus. The tendon within the muscle can be traced up nearly to each origin. The belly extends 9¼ cm. below the malleolus. The obliquity of the tendon to the axis of the limb is about 30 degrees.

The extensor communis is fleshy for almost its entire length in the lines corresponding to the first, second and third digits, while the slips for the fourth and fifth toes are tendinous.

The slip for the fourth toe separates 7 cm. above the anterior margin of the foot; that for the fifth, 23 cm. Of the two the quintal slip is the more important. This slip is deflected from the main trend of the muscle at a angle of 20 degrees, passes obliquely downward and backward so as to traverse the entire lateral surface of the limb, crosses superficially the tendon of the peroneus brevis 6 cm. above the insertion of this muscle. The tendon can be traced upward to a point 7 cm. from the origin of the muscle.

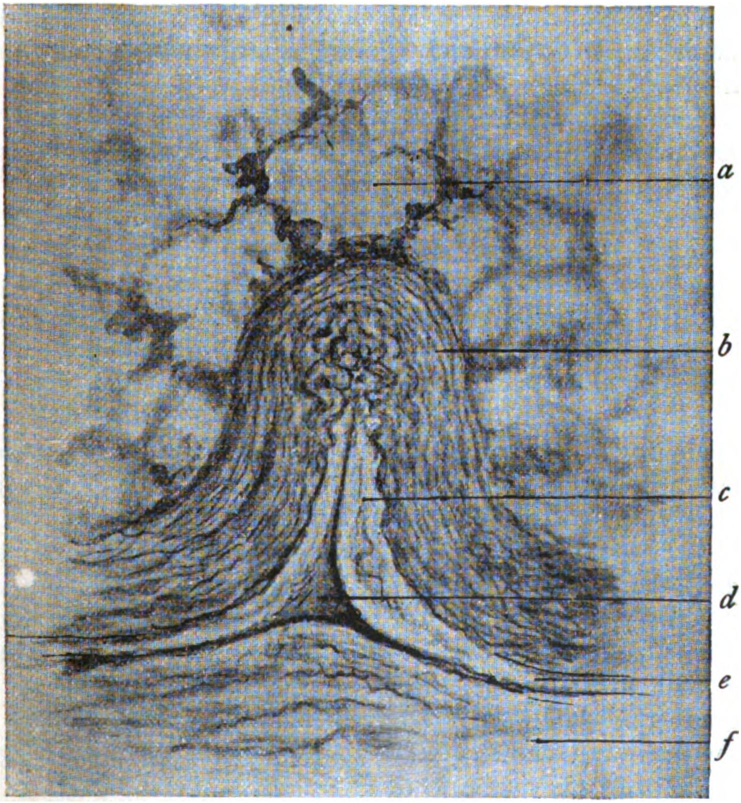
The extensor brevis digitorum sends a slip to the quintal division of the communis and can be traced the entire length of the muscle.

A second slip serves to strengthen the tendon of the peroneus brevis. A conjugal slip between the extensor brevis and the communis occupies the interval between the tendons of the peroneus brevis and the extensor slip to the fifth toe.

III.—NOTES ON THE LUNGS AND DIGESTIVE APPARATUS.

BY R. S. HUIDEKOPER.

The macroscopic anatomy of the digestive apparatus of the elephant has already been well described. The facial and maxillary muscles descend, and form the lower lip, much as they do in the horse; on the upper jaw they form two fibro, fatty, and irregularly disposed muscular cushions, around the tusks, and transversely between these. From this point the muscles re-arrange themselves into distinct bundles of fibres, to form the trunk, which would answer well to the description given by the older anatomists, of the tongue of the horse, longitudinal, vertical, transverse and circular. The immense nerves and arteries of the trunk lie to the inner and under border of the latteral longitudinal muscles. The stomach is an exaggeration of that of the horse. Length of greater curvature, 1.24 metres; from œsophagus to fundus of cardiac cul de sac, 0 55 m.; lesser curvature, 0.49 m.; circumference, 1 m. The enormous cardiac cul de sac is lined with squamous epithelium, while the stomach, from the œsophageal opening to the pylorus, is lined with columnar cells. The spleen, 1 metre in length and remarkably narrow, hangs by a short epiploon only 12 cm. from the greater curvature of the stomach; the great omentum is folded in all the coils of the gut, forming, when stretched, an immense web some 2 metres in depth. The duodenum passes from the pyloric end of the stomach to the left-hand sub-lumbar region and ends in a small gut about 15 metres in length, which hangs by a mesentery 0.50 m. long. The circumference of the small intestine does not vary much from 37 centimetres. The cæcum is only the length of that of the horse,



a. Lung tissue. *b.* Visceral pleura. *f.* Parietal pleura. *c, e.* Lymph space corresponding to pleural cavity. *d.* Point of attachment or elastic pulley uniting the two pleural membranes at intervals of 1 mm.

but has a circumference of 1.10 m., and in it the transverse folds and longitudinal bands are much less marked. The colon is some 9 metres in length, and hangs from a mesentery in spiral coils like that of the small intestine. Microscopic examination of the structure shows the same lining epithelium as in the horse, but the basement membrane contains much more elastic tissue. The termination of the great colon returns to the right-hand side of the end of the duodenum, makes a loop around it to the left, and ends shortly in the rectum. From this disposition, it will be readily seen that the digestive tube is mechanically one of the simplest in veterinary anatomy.

The lungs, which weigh about 27 kilograms, are excessively dense in structure and contain a large amount of elastic tissue.

Former anatomists have denied the existence of a pleural cavity, but this cavity exists, in the form of a series of serous separations covering each alveolus. Over the periphery of the lungs each alveolus presents a small convexity one millimetre in transverse diameter, covered by an endothelial layer of pavement cells. The basement membrane of the visceral endothelium contains a large proportion of elastic tissue, which sends out septa, uniting with the parenchyma of the lungs, and surrounds the alveoli, which are one-half greater than those of the ox. The parietal layer of the pleura is made up of equal quantities of connective and elastic tissue, fastened by its outer face to the internal wall of the ribs and intercostal muscles. The inner face is scolloped by an increased amount of elastic tissue, which is lined by an endothelium, but at each division between the alveoli on the periphery of the lung, this external layer sends down a dense elastic band, to unite with the pulmonary parenchyma. There is, then, an individual serous sack over each alveolus of the lungs, which allows of free movement at every respiration, while the elastic attachments serve to support the excessive weight of the thoracic viscera in this animal.

ART. XVI.—LANOLINE.*

BY DR. ALEXANDER GLASS.

About the beginning of the year 1886, a German physician by the name of Prof. Oscar Liebreich read a very able and exhaustive paper on a new preparation obtained from wool fat called Lanoline; this is a neutral fat of the cholesterine order. Since making known the results of his researches, a number of practical experiments have been made by noted dermatolgists on man, and by myself on a number of animals, and in all cases with excellent results.

It is not exactly new in medicine in one sense, for it was used and spoken of by the ancients under the names of Oesipus who also gave the method of preparation. It was a crude material, and from the method of its preparation very impure, it therefore fell into disuse. The method of preparation is a simple one.

It is an ointment of a light yellow color, or under the name of Aguine a dark preparation is to be had; the former has a slight woolly odor like the sheep, or new woolen cloth, not at all unpleasant, the latter is dark and has a very decided odor. It is pasty and tenacious in character, resembling very thick honey, little or no taste; on exposure to air it turns a bright orange color, probably due to the ábsortion of the water it contains. The property it posseses of taking up water is surprising, at least 75%, forming a yellow, easily worked ointment; it is said to take up equal parts by weight, but as we obtain it, it generally contains 20 to 30%. Its melting point is about the temperature of the skin, or about 90 to 95°F., which is an excellent property especially for ointments. It is neutral in reaction and it is almost impossible to decompose it; it combines freely with water, oils, fats and glycerine.

As a base it is in several ways far superior to either lard or vaseline, or as it is sometimes called cosmoline or petrolatum. Lard is not neutral, it is readily decomposed even if benzoated and by the formation of fatty acids, oleic and butyric, becomes rancid, and an irritant effect is produced on the affected parts to which it is applied; vaseline is neutral and not readily decomposed, but as all paraffine products are very insoluble, the drugs mixed with them are only held mechanically in their bodies and only small parts comes in direct contact with the skin, and is absorbed. Dr. Shoemaker says that the power of vaseline to penetrate is so feeble that it is a question whether it can justly be said to possess such a property.

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*Read before the Pennsylvania State Veterinary Medical Association.

With Lanoline, on the contrary, the great property is the readiness with which it is taken up and absorbed by the skin, penetrating deeply into the tissues, holding the drug incorporated with it in suspension, carrying it with it and producing an effect on the deeper tissue of the derm, an effect hitherto only obtainable with the oleates or lard, and that not at all perfectly. Lanoline can be used as a base for almost all diseases of the skin, met with in veterinary practice. In acute eczema, combine with boric acid or iodoform, boric acid 10 parts to 90 of Lanoline; and in some cases where a large surface is to be covered, 20 parts of lard may be incorporated with it rendering it soft and more readily applied; or iodoform 10 parts, lard 10 and Lanoline q s 100.

In chronic eczema, frequently seen in the dog, preparations of tar, or the sulphides. Pices Liquida (tar liquid) 15 parts to 85 of Lanoline, or oil of cade 20 parts to 10 of lard and 70 of Lanoline.

In Erythematic diseases as chafes, galls, scratches, an ointment composed of Plumbi acetas, Sulphur, Salicine, each 10 parts, 20 of lard and 50 parts of Lanoline is an excellent preparation. In those extremely painful attacks of mud fever seen in the last month, 5 grains of opium lessens the pain very much. Uticaria, nettle rash, hives, etc., causing often extreme itchiness, 40 parts of simple lead plaster, 10 of lard and 50 of Lanoline act very nicely lessening the pain and drying the small vesicles; for exuberant granulations (proud flesh) 10 of iodoform and 90 of Lanoline.

In the parasitic diseases of animals, (Dermatodectes, Sarcoptes, Demadere folliculorum, etc.,) it is evident that Lanoline from its power of deep penetration will carry any destructive drug to such parasite into its home and destroy it; one of the best preparations in such cases is beta-napthoil or in the more crude form some of the tar preparations; Oleum pices, oil of Cade, Pices liquida. The preparation of beta-napthoil is 3 parts, 12 of lard, 85 of Lanoline; the animal to be washed thoroughly to remove scabs, etc., and then a small quantity well rubbed into the part, taking care to allow no excess to remain, lest the animal should lick it.

ART. XVII.—UMBILICAL AND VENTRAL ENTERO-EPIPLOCELE, WITH A REPORT OF THREE CASES SUCCESSFULLY TREATED.

BY DANIEL D. LEE, M. D. V.
Instructor in Anatomy and Operative Veterinary Surgery, Harvard University.

In the human embryo complete closure of the abdominal cavity takes place at the eighth week. It is not uncommon for a cleft to remain near the umbilicus, through which comes a peritoneal protrusion containing a coil of intestine. This forms a bulging mass, from the apex of which arises the umbilical cord. This is a common malformation. The sac is usually small; in rarer cases the cleft extends for nearly the whole length of the abdominal wall. Occasionally, the abdominal wall is closed in the neighborhood of the umbilicus, while there is a fissure above or below it; in these cases there is generally ecstrophia of the bladder.

These remarks apply equally well to all our animals, the time of closure of the abdominal cavity of course varying with the length of pregnancy. Such herniæ may be recovered from spontaneously during youth by the proportional shortening of the mesentery with the growth of the animal; or they may persist, grow larger, and finally cause the death of the animal, as seen in pigs thus affected, the animal being found dead some morning from strangulated hernia after being fattened for the market. These herniæ may also arise from some external stretching force, by which the peritoneum is dragged outwards, or, it may be pressed outwards by a tumor.

Other causes of the acquired form are degeneration and giving away of the abdominal wall, stretching apart of the fibres of the linea alba, sudden strain or exertion generally causing it. Again I have seen rupture of the muscular walls, the skin remaining entire, caused by a thrust of a cow's horn. The intestines escaped through the opening, and formed a large bulging tumor under the skin. The cow was killed.

To accomplish a cure, I advise an operation which I shall describe. Trusses are useless in all animals, as they are always misplaced or torn off by the efforts of the animal to free itself.

Case I. A colt about five months old had a tumor over the seat of the umbilicus. I was called by another veterinarian to advise whether it should be operated upon or not. On examination I found the tumor to be an entero-epiplocele, entirely reducible by manipulation, the opening through which the descent took place being about the size of the middle finger. On inquiry I found that the tumor was congenital, but that its size and the capacity of the opening into the abdominal cavity had decreased one-half within the last six weeks. I therefore advised that it be let alone, as the proportional shortening of the mesentery with the growth of the animal would affect a cure. Within a few weeks the tumor had disappeared.

Case II. A pig four months old, had a small tumor on the belly when bought, but within the last week or two the tumor had so increased in size as to drag on the ground. On examination I found a tumor about the size of a musk melon, which was easily reduced when the pig was laid on his back, but when he walked it dragged on the ground. The opening of the sheath was on the inferior surface of the tumor. I considered the case as needing instant attention, so I ordered the pig starved for two days and gave him a cathartic.

On the third day I secured him on his back, and having etherized him and washed the tumor, I cut through the skin covering the anterior face of the tumor, in order not to injure the sheath, and exposed the peritoneal sac. This I separated by means of my finger, from the skin until I got near the opening in the muscular walls, when I was obliged to use the knife. Having completed the separation, I returned the sac through the abdominal opening and took two wire and three silk stitches through the muscular walls, in order to close the opening. I then sewed up the skin and let the pig go.

Recovery was complete; during the first few days there was considerable serous infiltration into the loose skin over the seat of the tumor; this soon disappeared. I did not take out any of the stitches.

CASE III. The last case was in a dog. The tumor was very small in the beginning but increased till a swelling as large as an egg was seen over the umbilicus. I operated in the same way, except that, the sheath not coming so far forward, I was able to cut on the inferior surface. This case also made a perfect recovery.

I have seen three calves with umbilical entero-epiplocele, who were operated on by the method of ligating the skin after reducing the tumor by manipulation; none of them were benefited. I have also seen a bitch with *ventral entero-epiplocele,* who was operated upon as I recommended, and made a perfect recovery. If it is possible to operate on dogs and pigs, why not on foals and calves?

When a cure is attempted by ligating the skin at the base of the tumor there is but a small chance that the lips of the muscular opening will be brought together, and this is necessary in order to bring about closure of the orifice.

In those cases where the hernia, be it umbilical or ventral, is congenital and does not increase in size, or decrease, I advise letting it alone. In cases where it is acquired or congenital, and *increases* in size, I advise an operation as follows:

Starve the animal for two days, and give a cathartic; give no water for twenty-four hours before operating. Securely restrain the animal, etherize and then turn on the back. Wash the belly thoroughly with soap and water. Reduce the tumor as far as possible by manipulation. Cut through the skin down to the peritoneal sac, separate the sac from the skin and dissect away its adhesions to the lips of the opening in the muscular walls. Wash the sac, and return it and its contents to the abdominal cavity, enlarging the opening in the muscular walls, if necessary, to accomplish this. Take a sufficient number of silk, or wire sutures in the lips of the muscular opening to close it entirely, and suture the skin over this, leaving a depending opening for drainage. Through this opening bring the ends of the inner silk sutures to keep it clear, tie these ends to one of the sutures in the skin. Let the animal go, and keep the parts clean; avoid all severe exercise for a week or more. Take the stitches out or leave them in as you think best, I always do the last.

ART. XVIII.—BARSATI, OR ATROPHIC CARCINOMA.

BY RICHARD W. BURKE, A. D. V.
Cawnpore, India.

(Continued from page 66.)

I propose to call attention to the consideration of the more salient particulars concerning the clinical characteristics of this disease, which, though discussed nearly fifty years ago, are by no means an already completed work, but requiring greatly to be extended. With the facts recorded in the past regarding Barsati, it behooves both scientists and practitioners to look to their diagnosis, to improve if possible our knowledge of the clinical history of the disease, so that its application to pathology should become both wider and more precise; for the precision of our results in practice must depend upon the perfection of our diagnosis. There is a wide field before us in the study of this disease, and I trust others will join in ensuring its cultivation by extending their inquiries to every department of this important subject. The combined clinical experience of the veterinarians of the past fifty years or more, as recorded in the February and April numbers of the *Veterinary Journal* for 1885, is of great importance, and indicates many questions which urgently need answering. The relation of Barsati to cancer of man has presented great interest since our first announcement on the subject, and if the identity was not before actually suspected, the clinical observations and experiments which appear in the past literature of the disease clearly point in this direction, and which establish the identity contended by me beyond cavil or dispute. There are included in the facts given, reasons which, not refuted by the parasitic theory, require separate and permanent recognition.

We must now examine the several clinical features of Barsati and human cancer, and see if we can find that any of them show marked and definite relations to each other. I give quotations of the disease as seen in the two different species, for it is necessary to form a judgment as to the relative characters of each and to have a wide overlook on experiences which have been in the past recorded. My opinion is, and it is founded on careful investigations of many years, during which time I have witnessed the disease in its most varied and pronounced aspects, that Barsati is a disease common to robust condition of body, and that, although appearing in all animals, it is most frequently seen in horses having reputed good condition of body, the health only suffering in proportion to the advance of the disease from local parts to the internal organs. I believe the recorded experience of other veterinary surgeons shows this conclusively. And the experience of surgeons regarding cancer in man is, that, "prior to, and for a long time after the appearance of a cancerous sore, the constitution is distinguished, in most cases, by its remarkably healthy characters, and by the absence of any appearances which would indicate disease."* The great question which is thus raised is as to the condition of patients previous to the appearance of this disease, and the general answer is, "Remarkably healthy." Mr. Smith † characterizes the condition of horses subject to Barsati as "vigorous."

Most authors who have written on cancer state that simple wounds and ulcers sometimes become the seat of cancerous disease, and that the epithelial form of cancer does frequently arise in the chronic ulcers themselves. Now, what is the experience in regard to Barsati? I shall quote Mr. Hart,¶ who writes, "Simple sores and galls, if neglected, are very apt to assume *bursattic* action": which is the general experience of practitioners in India. Writers on cancer lay great stress on

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*Treatise on Cancer, by R. Mitchell, 1879.

†Veterinary Journal, 1881, p. 308.

¶Veterinarian, 1873, p. 17.

"induration of the sore" as especially distinguishing cancer, a fact emphasized by those who have seen anything of Barsati before writing upon it. I. V. S. Oliphant,‡ in charge of Hapur Stud, observes: "From rubbing or biting—for the sore is particularly itchy—the crown of the ulcer becomes violently detached, leaving a moist, irritable sore, *the base of which speedily becomes indurated.*" Mr. Hart, in his paper on Barsati, describes "an indurated base extending to a depth of half an inch or an inch." Another important feature of Barsati, is the presence in the sores of pain or irritation felt at different intervals. Mr. Hart writes, what must be in the experience of every one, that, "Barsati sites, though healed, are liable at any time to become irritable and to be gnawed by the horse; this act showing beyond dispute that some irritative action is going on." This pain is certainly considered very characteristic also of human cancer, although it is not constant, or the patient could not live, but comes on at intervals only.

A fact of some importance in the clinical history of Barsati is, absence of inflammation characterizing the sores. I. V. S. Meyrick, in a lecture delivered at the Aldershot Military Veterinary School in 1881, said, the disease was "non-inflammatory" in its character; and John Hunter, in 1828, wrote, "True suppuration arises from inflammation, terminating in a disposition to heal, which is not the case with cancer." The sore in Barsati in the early stage is, moreover, usually single, as in cancer, rarely becoming multiple until a late stage, and seldom even then; while the sores in parasitic disease are mostly multiple. The points of junction of skin with mucous membrane, as well as parts exposed to friction, are most frequent sites of Barsati ulceration. Hence the favorite seats of Barsati are seen to be the angles of the mouth and the lips, which are liable to irritation by the bit, &c.; the inner aspect of the fetlocks, more especially in horses given to habitual "brushing"; the prepuce; the lachrymal region, &c. The results of operation have likewise proved most unsatisfactory in the case of Barsati as in that of human cancer. I. V. S. Oliphant ‖ writes: "The state of the system existing in Barsati is not one that indicates the use of the knife;" and Dr. Walshe says, "Cancers which have become quiescent have sometimes been cut out, and the operation been followed by rapid reproduction of the disease." Dr. Cooke writes: "From 1851 to the end of 1863, we have had the opportunity of seeing at the Cancer Hospital 413 persons who had been operated on for cancer; and it will astonish the reader to be told that the average lapse of time before the disease returned in these cases was no more than *six and a half months*."* The experience of Veterinary-Surgeons in India shows that Barsati sores which, under appropriate treatment, generally subside about the end of September, re-develop their activity next March, April or May.

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‡Veterinary Journal, July, 1880, p. 18.
‖Veterinary Journal, July, 1880.

We have already shown that the presence of tubercle-like nodules in Barsati sores is diagnostic. And Dr. T. Weeden Cooke, on the subject of cancer in man, on page 93, writes: "In many cases the incisions made for the purpose of removing the diseased mass have scarcely healed before '*tubercles*' have appeared around the cicatrix, or the wound itself has taken on the diseased action." Dr. Green† says: "The cells may be so closely packed as ultimately to become hard and dry like those of nails and hair, and the globes are then of a brownish yellow color and of a firm consistence. These globes are often large enough to be readily visible to the naked-eye." Professor Billroth considers the presence of nodules in the skin, when numerous and well-characterised, *diagnostic* of one variety of cancer he has specially studied in Europe.

In their general history, clinical and post-mortem characteristics, course of development, and in the nature and extent of influence producible upon them by treatment, Barsati in the horse and cancer of man are identical. Excepting perhaps the lesser fatality in herbivorous animals noted by M. Leblanc,‡ there is perhaps no feature of Barsati which may not be observed in cases of human cancer. Some of the above facts, I trust, may help accurate diagnosis, for I am of opinion that under the name of Barsati are often included a host of other diseases which have only a surface or chance resemblance in common. It is the custom at the present day to call every ulcer which is long in healing "Barsati." I trust this will not influence future diagnosis. On the other hand, a simple wound may precede the development of true Barsati by weeks or months. Analogous to this form of disease is epithelioma in the human subject, as a sequel to psoriasis of the tongue. Many veterinarians must, like myself, have met with many cases of Barsati originating in simple sores.

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*On Cancer: Its allies and counterfeits, pp. 92–3.

†Green, Morbid Pathology, 1878.

‡Recueil de Med, Veterinaire, 4th Series.

It has been asserted by many persons that the disease is capable of being cured, and, indeed, that it naturally terminates with the rainy season. In this " cured " condition the disease will be found, however, to put in an appearance year after year, when its activity is set on foot; destructive lesions, both external and internal ensue; health is superseded by disease, and death becomes imminent. A most misleading statement was recently made as to the reputed prevalence of Barsati during the rains only. Experience has long since shown that the disease may occur either before, during, or after the rainy season.

The disease successively appears, recedes, recurs, exacerbates—all these under the influence of extrinsic causes, the chief of which is irritation, the result of atmospheric causes, of attacks from flies, and that resulting from the application of corrosive dressings, the use of the knife, &c. In fine, all that is calculated to excite inflammation in the part arouses the disease from its lethargic condition into active play by favoring the extension of the diseased cells in every direction. The latent fault of the system being present, the tendency to form abnormal tissues from imperfectly developed germinal or cellular structure, will be brought into active existence by many external exciting causes. There is no new foreign substance which is deposited among the healthy tissues, but an alteration only of the natural cell-growth or germinating material, which has lost its power of forming healthy structure, results. John Hunter said: "Where schirrus is entirely let alone, it is commonly very slow, and may sometimes continue for years; but when inflammation is excited, its progress is accelerated, inasmuch as inflammation is an increased action of the part itself as well as of the surrounding parts."

It is said that recession of the sores is peculiar to Barsati only, but I am not enabled to endorse this opinion. It is well known that alternate cessations and recurrences of the sores characterize human cancer quite as much as they do Barsati. Dr. Campbell de Morgan, F. R. S., writes*: "A remarkable and not very explicable phenomenon is the arrest of cancer growth and the gradual wasting of the diseased mass. The activity of the whole mass is arrested, new cells cease to be formed, and the tumor fades—*a widely spread mass becoming quiescent and then fading throughout its whole extent.* It shifts the difficulty back a stage or two to suggest that the recession of cancer takes place in obedience to the law under which local atrophy, independent of inflammation or disease, may occur; or that it may be due to some want of organizing power inherent in it from the first, *as some cancers seem born to be atrophic.* It is, under any circumstances, a most important subject for investigation."

From the foregoing remarks it must not be concluded, however, that the period of respite due to atrophic change, is an invariable feature of Barsati. Not by any means has such been found to be the case in our experience of this disease; for, it is usually noticed in the milder cases only, where constitutional symptoms are also absent; whereas it is not at all uncommon to see sores existing before and persisting throughout the winter as well as during the summer. In many cases the disease runs its destructive course in a few months. Had our knowledge of cases ended when the disease first showed signs of local arrestation, we should have been compelled to adopt the prevalent theory of reported cures; but fortunately our cases have gone further, and in too many instances revealed the nature of our panacreas. It is not at all unlikely that some of us have the opportunity of seeing this disease, in our equine patients, at an earlier stage than others generally see it; and sent as these patients are for treatment often after repeated recurrences, we rarely have an opportunity of testing the precise value of many vaunted remedies during its different stages. Experience has shown that recurrence of Barsati is not confined to the wet weather. It remains to be acknowledged, however, that though this is the case, yet, the disease having once established itself, its return *in loco* is rendered probably more certain during the rains than in any other season. The fact itself, we may observe, appears inexplicable to many who recognize it as such, but its causes are, notwithstanding, capable of explanation; for, as Dr. Moxon* has observed, moisture intervenes, together with the other unfavorable influences of accompanying heat, etc., during wet weather, which augment cell-growth in cancer structures. The effect of moisture in the atmosphere during the rains, therefore, is an increase of cell-activity and a general acceleration of all the worst accompaniments of Barsati.

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* Med. Times and Gazette, 7 March, 1874, p. 259.

Many observers exalt special remedies in the treatment of Barsati, and as usual, each produces a list of cures in favor of his favorite application. Further evidence of the difficulty of settling this point is afforded by general experience which disproves the utility of these cures, and shows that their benefits have been overestimated. It is now proved that it is impossible to influence the course of Barsati by recourse to any number of acknowledged parasiticides which have been recommended; and I have myself tried, in numerous cases, local applications of caustic potash, nitrate of silver, chloride of zinc, chlorate of potash,† sulphate of copper, of iron and zinc, salicylate of soda, salicylic,‡ nitric, sulphuric, acetic, and carbolic acids, myrrh, aloes, camphor, alum, sulphur, &c., without effect. Iodine and sulphurous acid injections have been latterly tried by me in many private cases, with equally useless results. T. Marriott, A. V. D., speaks very highly of the results of treatment by iodoform. Very extensive Barsati growths on the fetlocks and lower lip and angles of the mouth have been gradually destroyed by caustics followed by iodoform dressings, and a healthy cicatrix has been obtained. How long an immunity from this disease has been secured, it would be difficult to say; but at any rate it is a considerable gain to have overcome, even for a time, the unsightly and ever increasing out-growth, and to have thus early relieved the animal from pain, and returned him to duty. Calomel and biniodide of mercury were largely employed in the government studs some years ago, but with no better results than any of the above mentioned. Carbolic acid, when well diluted, has the effect of cleaning the surface; but when in strong solution, undoubtedly aggravates the growth in many cases. For the purpose of removing discharges from the surface, and keeping the sore free from smell, I never employ a stronger solution than 1 part in 20 parts of water, for the reasons above stated. Its efficacy, however, is no greater than that of most other agents in common employment. Mr. John Henry Steel, A. V., D. recommends the iodide of arsenic ointment (1–6) as a useful application, to cause a slough. The use of the actual cautery and of the knife is in every case contra-indicated, as it generally increases the activity of the growth. Thus we have tried every remedy, and during every stage of this disease, with the same negative results. At the risk of appearing tautological I would add one other remark upon these operations by the knife, actual cautery and caustic agents. "Be quite sure that you remove *all* the induration, or you will do mischief instead of good." I might give a long list of "successful cases," such as are frequently recorded in the veterinary journals; but as I know from experience such cases have returned for treatment after they had been passed as "cured," I set no value on these temporary successes, and look upon them as mere compromises, which advancing knowledge will enable practitioners to discard, for a more radical and permanently successful treatment. So long as we continue to look upon Barsati as a mere local disease, so long shall we fail to effect more than a temporary recovery.

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* Moxon, "Trans. Path. Soc.," XX, 28. See Arnott "on Cancer," 1872, p. 70.

† Berl. klin. Wochenschrift, No. 6, 1873.

‡ Wien. Med. Wochenschrift, No. 24, 1883.

Where Barsati is indolent, it is wise not to attempt its removal by the knife or by any caustic applications. Such indolence or arrested growth in an external sore is sometimes coincident with its internal devopment. Inspecting Veterinary-Surgeon Oliphant says—"The state of the system existing in Barsati is not such as indicates the use of the knife." Dr. Walshe, after condemning operation for the relief of human cancer, quotes Dr. Macfarlane, who "could adduce the cases of several patients who had labored under cancer for ten, fifteen, and twenty years who were cut off in three or four months by an operation."

Pari passu with the advance of the external sore I have noticed defects produced in the constitution of the animal, which should be early supported by appropriate medicinal remedies. The results of this combined treatment will be generally found to be more satisfactory, although how long an immunity from this disease may thus be secured in all cases I am unable to say, but at any rate it is found to be a considerable improvement on the local treatment only, and affords better hope of restoring the patient to work and keeping him out of sick-lines long after others have been admitted with a locally recurrent disease of aggravated character. I know from early experience that it is no good "patching up" a case and returning to duty, which comes back in a few months with considerable constitutional disturbance. I know of no specific remedies that will avert the constitutional derangement, but would recommend the system to be supported on general principles, by the administration of both vegetable and mineral tonics, but especially by iron and arsenic in large doses. Any of the preparations of phosphorus might also prove useful. The influence of phosphorus and arsenic on the general nutrition is analogous to their influence on the nuitrition of the skin and subcutaneous tissues, which is seen in the case of many skin affections.

Our search for agents to neutralize and destroy this disease in its local aspects should lie in the direction of those which shut it up, or encase it, as it were, by hardening its cells The subcutaneous injection of medicine promises the most likely means of doing this. The best agent which will affect this is chromic acid, which in the field of the microscope is seen, even in a solution as dilute as one part in a thousand of water, rapidly to define, as if dissecting out the delicate cells, hardening and enclosing the nuclei, closing up their walls, and so preventing the diffusion of their contents. Professor Billroth's use of this agent as subcutaneous injection in lymphoma of the human subject, gives encourage-ment to the trial of the same in equine Barsati. Akin to the action of the subcutaneous injection, the use of chloroform in external application bids fair to be useful in the treatment of local Barsati. It is a most useful "carrier" to vegetable alkaloids, promoting their absorption. Its action in causing the absorption of vegetable alkaloids seems to depend upon the removal of the cuticle, thus exposing the absorbing surface of the cutis vera. Professor Trinchera,* of the Naples Veterinary School, believes he has cured cancer of the penis and scrotum in the carnivora, by early operation, the wound being dressed with chlorate of potash. Malthe, reccommends combining iodoform with nitrate of silver as a caustic and healing application in all chronic ulcers. The ulcerated surface is sprinkled with iodoform, on which the nitrate of silver is next applied, and on this again iodoform. A brisk effervescence of nitrous acid and insoluble iodine and chloride of silver results. This may be employed with much benefit in Barsati ulceration of not long duration, and where the subcutaneous tissues have not been deeply implicated.

The above remedies have been described by me in many cases with good results, where constitutional disease was not already far advanced. No one remedy can be expected to produce a cure, and this alone illustrates the absurdity of the dogma, that any "specific" can eradicate a general disease by treating its local manifestations only. We must at present hope for a mere gradual suspension of local disease by treating on general principles.

I have given the above summary with the view of furnishing a general experience in regard to results of different modes of treatment in different cases. Most of the remedies mentioned have been tried by me, as well as other practitioners, in the treatment of this disease. I have, however, to say something further of certain preventives which have not been described before, and which come under the first category in the preceding summary. Those cases in which the sore has apparently been of short duration may be much benefited by a change of climate to the Hills.

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* Giornale delle razze degli Animale utili e di Med. Veterinaria, 1875.

Those in which the constitution is severely involved may derive temporary benefit by a similar change. But in some cases the result is disappointment; the local disease persists and grows in spite of all treatment, and sometimes fresh ulceration takes place in an already healed cicatrix, so that the treatment of Barsati must be considered only palliative in kind. When the disease has been suppressed by the above-named means, a relapse is rendered less certain if the animal is kept on a strictly starchy diet.

We are not assured that Barsati is hereditary in its character. Colonel McDougal, Superintendent of Central government studs, tried to show from statistics that it was so. A safe practical conclusion to arrive at is, that all stallions which have suffered from this disease, although temporarily recovered from it, should be castrated, and brood mares similarly affected be disposed of by auction sale; they should not be retained for breeding purposes.

Art. XIX.—JEAN BAPTISTE AUGUSTE CHAUVEAU.

Jean Baptiste Auguste Chauveau was born at Villeneuve-la-Guyard (Yonne), France, on the 21st of November, 1827. Locality and climate, which in the Midi keep the olive trees green the year round, and furnish orange flowers in midwinter, left their trace on M. Chauveau, and bred in him the genial, warm-hearted, hospitable nature belonging to men of the South. Educated at the Royal Veterinary School at Alfort (Seine), M. Chauveau received with fervor the accurate scientific teachings of the colder blooded Frenchmen of the North, and laid the foundation for that minute application to details, and ready appreciation and comprehension of complex subjects, which have made him a leader of the veterinary profession, and a peer of all scientists. Immediately upon receiving his diploma as veterinarian at Alfort, M. Chauveau was appointed Chief of the Anatomical Service at the Veterinary School at Lyons, France, (1848).

The commencement of his career was marked by publications of importance on comparative anatomy, and on the physiology of the heart and nerves. Upon a vacancy being created by the promotion of M. Lecoq, M. Chauveau was nominated to a Professorship in 1863. He became Director of the Lyons Veterinary School in 1876, and was made Professor of Experimental Medicine in the Faculty of Medicine at Lyons, in 1877. Upon the death of the great *M. Bouley*, M. Chauveau was appointed Inspector General of the Veterinary Schools of France, in 1886.

M. Chauveau is probably best known to the English speaking members of the Veterinary profession as the author of the standard text-book, "Anatomie Comparee des Animaux Domestiques," first edition, 1854; translated into English by Mr. George Fleming. The second and third editions of the Anatomy, published in 1872–1877, with the collaboration of M. Arloing, by D. Appleton & Co., New York, were but examples of M. Chauveau's wonderful facility for teaching and developing in those who had the pleasure of working under him, the love of truthful observation and ability of expression, which are inherent parts of himself; there is probably no living scientist whose work is so minute, and whose reports can be accepted as so absolutely accurate and correct. In his laboratory at Lyons a visitor is made to feel like an ambassador, a student like a son, and the veterinarian who has been thrown personally with M. Chauveau, recognizes that his profession is the greatest in opportunity and future of any art which man can follow.

M. Chauveau is correspondent of the Academie des Sciences, Laureat de l'Institut, four prizes.

Associate member—Academy of Medicine (Paris); Society of Agriculture; Society of Biology; Central Society of Veterinary Medicine; Society of Vet. Med. of St. Petersburg.

Honorary member—Academy of Medicine (Belgium); Academy of Medicine, (Turin); University of Edinburg (LL. D.); Society of Medicine (London); Society of Medicine (St. Petersburg), etc., etc.

He is author of works on Rinderpest, 1865. Vaccinia and

Variola, 1866–1884. Septicæmia, 1872. Virus and Prophylactic Inoculations, 1868–1881–82. Attenuation of Viruses, 1880–81–82–83–84. Tuberculosis, nine papers, 1884. Anthrax, seven papers, 1879–80. Pyæmia and Puerpural Septicæmia, Hospital Gangrene, 1884. Anatomy—Comparative, genital organs of the cow, growth of horn. Mechanism of the heart and circulation, nineteen papers, 1855 to 1870. Hepatic Glycogeny, four papers, 1856–57. Function Spinal Marrow and General Physiology of Nerves, seventeen papers, 1857–1878. Semiology—Respiration, Circulation, six papers, 1858–60.

EDITORIAL DEPARTMENT.

RECENT RESEARCHES ON HÆMATOZOA.

BY WM. OSLER.

Blood parasites belonging to the Nematoda and Trematoda have long been known and certain filarian forms are very widely distributed. Recent observations indicate that the blood of many species of animal is infested with parasitic protozoa, some of which are probably pathogenic. Our accurate knowledge on this subject dates from the work of Mitrophanow, in 1883, (Biol. Centralblatt Bd. iii) who described in the mudfish and carp, organisms which, with a certain resemblance to small nematodes, proved, however, to be flagellate infusoria. Each consisted of a highly contractile proplasmic body, a spiral membrane and a flagellum. There were also forms without membrane or flagellum which presented amæboid movements. Mitrophanow regarded these organisms as infusoria, between the genera Cercomonas and Trichomonas and suggested a new genus, Hæmatomonas. In 1879 Lewis described (Quarterly Jr. Mic. Science 1879) in the blood of rats in India, mobile filaments which he thought at first were spirilla, but which he subsequently determined to belong to the protozoa. They were present in 29 per cent of Indian rats. Quite recently, Crookshank has investigated the subject (Journal of the Royal Microscopical Society 1886) and finds these organisms in 25 per cent of English rats. He describes them as polymorphic with slightly tapering bodies which terminate at one end in a stiff, immobile, spine-like process and at the opposite have a long flagellum, while longitudinally attached there is a delicate undulating fin-like membrane. There are various other forms, globose, angular, semi-circular and disc-shaped, representing phases in the development of this organism, which Crookshank refers provisionally to the genus Trichomonas.

In the Archives Slaves de Biologie 1886 (Abstract in Centralblatt f. d. Med. Wissenschaften 1886), Danilewsky describes hæmatozoa in birds, particularly water fowl, which have a close resemblance to those of the fish and the rat. Certain of the forms however occur within the red blood corpuscle, and the organism has amæboid and flagellate phases of existence.

So far as can be ascertained the existence of these parasites in fish, birds and in the rat in no way interferes with health, so that they can scarcely be regarded as pathogenic.

A practical interest in this subject has been aroused by the discovery of hæmatozoa of this description in the blood of animals and man affected with certain diseases. In 1880 Dr. Griffith Evans, described in horses, mules and camels in India, a disease called *surra*, which was exceedingly fatal in the Punjab. The affection is characterized by fever, jaundice, hemorrhages, rapid wasting, and death in from two weeks to two months. The Third Punjab Cavalry lost 300 horses in the epidemic. Evans found a parasite in the blood and was able to induce the disease in healthy animals by inoculation. He regarded the organism as a spirillum but subsequently concluded that it did not belong to the bacteria. In 1884 the *surra* disease broke out in Burmah in the transport mules, and Veterinary Surgeon Steele made an exhaustive investigation of the epidemic, and an elaborate report has been issued by the

Punjab government. He describes the disease as a true relapsing fever and regards the organism in the blood as a spirillum, similar in character to that of the recurrent or relapsing fever of man, and named it *Spirochæta Evansi.* Recently on his return from India, Dr. Evans placed his preparations in the hands of Dr. Crookshank, who had no difficulty in determining that the parasites in the blood were not schizomyces, but protozoa very similar to, if not morphologically identical with,the flagellate organisms described by Lewis in the blood of the rat. Both Evans and Steele regard the parasite as pathogenic, and when the disease is inoculated they occur in the blood in large numbers. Steele also determined that it was present during the fever and absent in the apyrexial periods.

Five or six years ago Laverau, a French army surgeon, stationed in Algiers, found certain bodies in the blood of patients affected with malaria. The observation of over 400 cases enabled him to assert that they were constant, specific and distinctive. There were several forms: 1st, a pigmented body in the interior of the red corpuscle which presented slow amæboid changes; 2d, crescentic bodies; 3d, free pigmented forms and 4th, flagellate bodies. These different forms he regarded as phases in the development of a parasite. These observations have been confirmed by Richard and more recently by Marchiafava and Celli in Italy, and by Councilman and myself in the United States. The description of the bodies by these various workers in different parts of the world is practically identical. The different forms are phases in the life history of a single organism and there can be no doubt that it too belongs to the flagellate protozoa. Marchiafava and Celli have called it the *plasmodium malariæ,* but I have suggested (British Medical Journal, March 12, 1887) that it be placed in Mitrophanow's genus *Hæmatomonas,* where it evidently belongs. Danilewsky calls attention to the similarity of the form he has described in birds to those which occur in malaria, and suggests that they are identical. They appear to be constant in the blood of persons affected with the different forms of ague and so far have not been found under other conditions. Whether pathogenic or not has not yet been determined.

THE INTERNATIONAL MEDICAL CONGRESS AND THE VETERINARY PROFESSION.

Are duly qualified members of the Veterinary Profession admitted to membership of the International Congress? is the question which, in September last, Dr. Ward, F. R. C. V. S., of Baltimore, proposed to the General Secretary of that body. An affirmative answer appears so naturally to be expected that the majority of thinking men who take an interest in those sciences which promote the welfare of humanity would consider absurd such a proposition. We are inclined to the same opinion, but the experience of the above-named eminent veterinarian would seem to justify the question.

In reply, the secretary stated that the question, being a new one, required reference to the Executive Committee, as no single officer could decide it.

What action was taken by the committee is not known, as Dr. Ward has not yet received, as ordinary courtesy would demand, any notification of the decision arrived at.

We presume that the hesitancy on the part of the committee is due to the fear of allowing entrance to men unfit to become members of an association of such high standing, and not to any reluctance to accept a union with the veterinary profession. No human physician can, to-day, deny the advantages to be derived from co-operating with the veterinarian in the field of scientific research.

Apropos of this subject are the following remarks made by Prof. Woodhead, M. D., at a meeting of the National Veterinary Association in Edinburgh, in reply to a vote of thanks accorded him for a paper he had read: "He could say from his own point of view, that it had been a very great pleasure to him and a very great profit; he had derived a very great deal of knowledge which he could not have otherwise derived, from engaging with Prof. McFadyean, V. S., in this kind of work." "One felt," he said, "how close the two professions were—how closely associated were medical science and veterinary science; and he felt that if they would only meet oftener and interchange ideas more freely, it would be of great advantage to both sciences."

On the continent, there is a tendency in this direction visible in many of the medical societies.

That a change of feeling in this country will soon occur, there is not the slightest doubt, and we predict that the near future will behold the two sciences marching hand in hand in the path of progress, and then it will be seen what good work has been accomplished by the science of comparative medicine and surgery. C.

TUBERCULOSIS IN THE GROUSE.—Dr. Morton Grinnell gives a history of some cases of the above disease in a late number of *Forest and Stream.*

Commenting on the importance of the discovery of the tubercle bacilli by Koch, of the dangers to which we are exposed of taking these germs into the body by means of our food and drink,cow's milk for instance, the Doctor refers to an article in the October number of the journal by Dr. J. B. Sutton on Avian Tuberculosis. The conclusion arrived at by the latter is that tuberculosis in birds is not developed by infection from man, as Nocard thinks, but is due to the formation and multiplication of this tubercule bacillus in congenial soil. The cases reported by Dr. Grinnell in which the grouse died after a confinement of six or eight weeks, and in which *post-mortem* examination revealed the existence of true tubercle bacilli, and the resulting lesions corroborate this view, although he does not think that the transmissibility from the sputum of tuberculous patients is a settled question.

There is no doubt, however, of the necessity of keeping the aviaries, barnyard, etc., well cleaned and disinfected. C.

VETERINARY SOCIETY MEETINGS.—Philadelphia has, during the last month, gone through an era in her veterinary history, which we are sure will be of benefit both to the profession of Pennsylvania and to that of the whole country. The details of the meetings of the Pennsylvania State Veterinary Medical Association, on March 14th, and of the United States Veterinary Medical Association, on March 15th, will be found in the Society proceedings elsewhere. Among the best discussions, that on the danger of feeding tuberculous meat and milk, must assuredly bring some good result.

These meetings were held in the amphitheatre of the veterinary department of the University of Pennsylvania. The first was one of the largest since the organization of the association, two years ago; it was marked by better attendance, and the proceedings assumed rather more of a professional character than has been permissible at the earlier meetings, when the adoption of constitution and regulations, and the difficulty of defining the qualifications for membership occupied much of the time. The United States meeting can be regarded as a great compliment to Philadelphia. There was gathered a more complete and representative assembly of veterinarians than have before been together in this country. They came from Massachusetts in the East, and from beyond the Mississippi in the West; from Canada in the North came its most distinguished veterinarian to greet his Republican neighbors.

At a dinner held by the association, in the Clover Club room of the Hotel Bellevue, before parting, the visiting members were met and welcomed by their local colleagues, by the President of the Philadelphia County Medical Society, by several of the editors of the daily newspapers, and by other prominent citizens. President Liautard was most happy in conducting the social proceedings and toasts from the chair, while Prof. McEachran, Prof. Salmon and Prof. Lyford, on the part of the profession, and Mr. M. P. Handy, Dr. Cohen, Mr. Megargee and Dr. Osler, on the part of the citizens, vied with each other, among the many others, in bright responses, which showed that the necessary feeling ot good-fellowship, and recognition by the public of the veterinary profession, is rapidly developing.

The germs of veterinary medicine have had good soil on the American Continent, but have been sparsely strewn and frequently have been much dried before sowing. Let us hope that the crops will soon be good.

H.

NOTES ON THE DISEASES OF BIRDS' BEAKS.—Since publishing my paper in THE JOURNAL "On the injuries of the beak in birds and the method of repair," I have received a very interesting specimen, further illustrating this subject, from Mr. William Dutcher, of New York City, Supt. for the District of Long Island, for the Committee on Bird Migration of the American Ornithologists' Union. The specimen in question is that of a common blue-bird (*sialia sialis*, ♂.), collected by Mr. Dutcher, on the 2d of November, 1886, at Locust Valley, Queens Co., N. Y., it having been shot out of a flock of eight others.

This bird was suffering from a peculiar disease of the mandibles, it being the first example of anything of the kind that has ever fallen under my observation. Both bills are profoundly involved, but only as far back as the normal limiting line of feathers, which do not seem to be in the least way affected by the proximity of the diseased condition. It seems to have consisted in a low, chronic inflammation of the external superficies of the osseous mandibles, under the influence of which they were slowly crumbling away, as was also the horny theca that covered them. Indeed, the superior mandible is already two millimeters shorter than the lower one, and both show in their roughened appearance the inroads made by the disease; the nasal apertures are here filled in, apparently by the dried discharges.

The cause of such a disease as this is unknown to me, and possibly it is entirely confined to the class aves; I would add that the specimen is in excellent plumage, and its feet are perfect, and present no evidence of disease of any kind whatever. As I did not see the body of the bird, I am unable to say how well it was nourished.

R. W. SHUFELDT, M. D.

Fort Wingate, N. Mex.

CORRECTION.—In report of Scottish Metropolitan Association meeting, in January No. of Journal—the remarks made on page 95 after line 11 were made by Professor Walley not Professor McF.

W. H. Harbaugh, V. S., of Richmond, Va., graduate of Ontario, desires us to state that he is not the Dr. Harbaugh who met his death in Knoxville, Tenn.

CASE DEPARTMENT.

AUTOPSIES AT CENTRAL PARK MENAGERIE.

Toque Monkey—*Macacus pileatus*, *Hab.* Ceylon. Male. Fairly nourished.

I. External Examination.—Fur absolutely swarming with nits and dead pediculi. The parasites are very small—about ½ line in size—but have the same general appearance as pedic. vestamenti hominis. A few ecchymoses and scratch marks on abdomen, neck, etc.

II. Internal Examination.—(*a*) *Spinal Canal*—normal.

(*b*) *Cranium.* Surface of cortex studded with minute hemorrhages. Ruptures of the vessels of the pia in numerous places. The effused blood lies under the pia along the course of the vessels. The left occipital lobe is entirely covered with a layer of blood. This effusion extends round over base of brain—and completely covers the pons; and surrounding the medulla just below this is a considerable hemorrhage. A number of minute hemorrhages in the corpus callosum. Brain substance otherwise normal. Medulla shows also a large number of small sanguineous effusions.

(*c*) *Thoracic Cavity.—Lungs—Œdematous and Congested.*—Both lungs are filled with a large number of pin-head-sized transparent grayish round nodules, mostly situated under pleura. They are hard, and can be "shelled" out of their capsules easily. *Heart.*—General thickening of parietal and visceral pericardium; numerous ecchymoses upon both layers. Muscle distinctly soft and yellow. In the heart substance are six hard, yellow nodules, pin-head-sized, contents cheesey. At base of heart is one the size of a large pea; its centre is fluid—and is similar to the purulent collections found elsewhere. *Bronchial Glands*—enlarged, soft, and of a dark, reddish-brown color.

(*d*) *Abdominal Cavity—omentum*—fatless. Glands enlarged, red and soft; one is bean-sized, with purulent centre. *Peritoneum.*—A few moderately firm old adhesions between the intestinal coils. In the visceral layer of the abdominal peritoneum, left side, three cheesy small-pea-sized masses. *Liver.*—On anterior surface of left lobe, a large bean-sized superficial abscess that broke in handling, letting out a considerable amount of greenish-yellow pus. The entire organ is one mass of abscesses, varying from a pea-size to one inch in diameter. Very little liver tissue is left. The more superficial abscesses have caused considerable perihepatitis, with adhesions to neighboring organs, stomach, intestines, etc. *Spleen.*—Studded with large and small cheesy masses and abscesses 1 line to ¼ inch in diameter. *Pancreas.*—Two purulent cheesy masses, each ⅛ inch in diameter. *Retroperitoneal glands.*—All enlarged, dark, soft. Some are purulent. *Kidneys.*—Pale and yellow; cortical workings very indistinct. Both organs are studded with large pin-head-sized purulent nodules; some are surrounded by a distinctly inflammatory and hemorrhagic zone of tissue. Pelvis of left kidney is filled with blood. *Bladder.*—Peritoneal surface ecchymosed. Substance contains three yellow purulent pea-sized masses. Mucus membrane shows a number of minute and several large ecchymoses. *Stomach.*—Mucus membrane studded with hemorrhages, some ¼ inch in size. *Intestines, Small.*—Serous surface ecchymosed in parts. In four places, purulent collections in the intestinal walls. *Large.*—The entire large gut is intensely congested. Its substance contains a large number of pea-sized abscesses and smaller blackish-brown nodules which are yet hard. Mucus membrane normal. *Rectum.*—Is bound firmly by adhesions to the large abscess to be next described; its mucus membrane is intensely inflamed—but there is no ulceration. No connection between abscess and gut.

A large fusiform swelling almost entirely fills the true pelvis and the lower third of the abdominal cavity. It lies in the median line along the spinal column, behind the peritoneum; it is pear-shaped, with apex up, and is tense. It contains over two ounces of greenish-yellow pus. Abscess walls are ragged and irregular, and at least a ¼ inch thick. Special and pelvic bones and ligaments normal. On each side it lies over the Psoas-Iliacus muscles—but is not in their sheath. On the left side it covers and is adherent to the rectum—but does not communicate with it. *Joints.*—normal. *Membrane, &c.*—no tubercles anywhere. *Cause of Death.*—Œdema and congestion of lungs. *Diagnosis.*—pyæmia secondary to large retroperitoneal pelvic abscess. Secondary abscesses of liver, spleen, peritoneum, intestinal wall, lungs, kidneys, or diffuse inflammation of pericardium, gastro-intest. mucus.

MACAQUE MONKEY *Macacus Cynomolgus.* *Hab.* India. Female. Dead 12 hours.

I. EXTERNAL EXAMINATION.—Moderate emaciation. Rigidity marked.

II. INTERNAL EXAMINATION.—(*a*) *Thoracic cavity—left lung.*—A few old adhesions. Moderate œdema. *Right lung.*—The entire root of the lung is encircled by a dense walnut-sized nodule, binding it to the posterior chest wall and involving the posterior thoracic glands. Size, 1½ x ¾ inch, with long axis, longitudinal. Nodule is distinctly circumscribed by a dense connective tissue envelope. The whole is a large, cheesy, degenerated inflammatory centre of old date. Thoracic glands enlarged throughout, some cheesy. In the right pleura, diaphragmatic, mediastinal and costal, are fifteen hard, white and prominent nodules, from pin-head to large pea-size; the largest are pigmented. They are all subpleural, cheesy deposits, encapsulated, like the larger nodule. Some are situated upon the ribs at their posterior angle, some along their anterior curves, and others again in the mediastinal and diaphragmatic pleura. Moderate œdema of lung. Marked anæmia of all thoracic organs except heart. No tubercles. *Heart.*—Markedly congested. No tubercles. *Pericardium.*—normal. *Larynx.*—Normal.

(*b*) *Abdominal Cavity—Liver.*—Entire surface studded with pin-point and pin-head sized, grayish-white, transparent nodules. The whole organ is crowded with tubercles—almost all evidently of recent origin. No cheesy masses. *Spleen.*—Enlarged. Moderately studded with tubercles. Five large, pea-sized, white, soft, cheesy masses project prominently from its surfaces. None are encapsulated, and most of them show an area of congestion around them, and enlarged blood-vessels running over their surface. *Pancreas.*—Normal. *Omentum.*—Almost fatless. Some dozen large, pin-head-sized, hard, white nodules, similar to those of left pleural cavity. *Mesentery.*—Glands enlarged and pigmented throughout. A few tubercles. *Peritoneum.*—A few cheesy nodules in the parietal peritoneum. No adhesions. *Abdominal lymphatic glands* are all enlarged. Perfect chains of them accompany the vessels and run along the attached border of the gut, especially along the colon and cæcum. *Intestines.*—Normal. *Kidneys.*—Absolutely white and bloodless, fatty. A few distinct tubercles in their capsules and substance. *Supra renal capsules*, *uterus and ovaries*, *bladder and stomach*—anæmic. The entire body, except the heart, was markedly anæmic, and the blood present was thin and watery to a very noticeable degree. No coagula in the large vessels.

Diagnosis.—Acute general tuberculosis, secondary to caseous degeneration of most of inflammatory products at the base of the lung.

WEEPING CAPUCHIN *Cebus capucinus.* *Hab.* Brazil. Male.

I. EXTERNAL EXAMINATION.—Moderate emaciation.

II. INTERNAL EXAMINATION.—(*a*) *Cranium.*—normal. *Cord.*—normal.

(*b*) *Thorax—Left cavity.*—A number of recent pleural adhesions. Entire lung solidified; general lobular pneumonia; œdema and congestion of non-affected parts. The solidified patches are solid and white; a few of the oldest and largest have white, cheesy nodules in their centres. *Right Cavity.*—Same conditions. A small amount of clear serum also. *Heart.*—*Pericardial sac* contains two drachms of clear serum. A fibrous clot four inches long, and containing a considerable amount of red globules in its meshes, is attached to the R. appendix auricular, and hangs down into the pericardial cavity. *Parietal pericardium.*—Normal. *Visceral pericardium.*—Rough in places, with spots of adherent lymph. *Heart muscle and valves, &c.*—Normal. *Posterior mediastinal glands.*—Are the size of large beans and filled with softened, cheesy matter. They are continuous above with the curvial glands, which are in the same condition, though not so large. The entire glandular mass is imbedded in firm, fibrous connective tissue, so that the whole forms a large tumor, three inches long by one inch in breadth and in thickness. The œsophagus and trachea pass through the centre of this mass.

(*c*) *Abdomen.*—Very little fat. *Liver.*—Fatty and congested, enlarged *Pancreas.*—Considerable number of pin-point hemorrhages in its tissue. *Spleen.*—Half larger than normal; dark red and softened. *Abdominal lymphatic glands.*—Enlarged throughout, dark purplish-red in color, and soft. Lymphatic glands throughout entire body in same condition.

Kidneys.—softened. *Intestines.*—Fragments of tape worm (2 heads). Both belong to second variety described before.

Diagnosis.—Chronic catarrhal pneumonia and peribronchitis, subacute pleurisy, sero-fibrous pericarditis, mediastinitis fibrosa, general lymphadinitis, fatty infiltration and congestion of liver, tænia.

Cause of death.—Exhaustion.

WEEPER CAPUCHIN (*Cebus capucinus*). *Hab.* Brazil.

I. EXTERNAL EXAMINATION.—Moderately well nourished.

II. INTERNAL EXAMINATION.

(*a*) *Cranium and Spinal Column.*—*Brain*—general congestion. Vessels at base atheromatous.

(*b*) *Thorax.*—*Lungs*—*Left.*—General congestion and œdema. Scattered nodules of chronic peribronchitis. Spots of ablutosis. Base of lung acutely congested. *Right Lung.*—Entire lung solid. Acute congestion and œdema of entire lung. A number of bean-sized nodules of lobular pneumonia. *Pleura.*—normal. *Heart and pericardium.*—Normal.

(c) *Abdomen.*—*Omentum*—is one-third inch thick and contains an immense amount of fat. The whole forms a large mass of fat, in which omentum, intestines and all the abdominal organs are enveloped. *Liver.*—Enlarged, congested and fatty. *Spleen*, *Pancreas*, *Kidneys*—normal. *Intestines*, *Supra renals*, *Bladder*—normal.

Diagnosis.—Congestion of the brain, œdema and congestion of lungs, peribronchitis, chronic catarrhal pneumonia, congested and fatty liver.

Cause of death.—Apuvea from œdema pulmonum.

WILLIAM S. GOTTHEIL, M. D., New York.

II. RUPTURE OF MESENTERIC ARTERY.—Subject, a bay Shetland pony (foal). The owner, a farmer, noticed that the animal appeared dull, was very weak, and refused to eat. He gave him a dose of ginger, and about half an hour later found him dead.

The post-mortem was made about ten hours after death. The abdomen was greatly distended. On making an incision through the wall, the cavity found to contain a large amount of partially clotted blood, about two large pails full in all. No peritonitis. Intestines appeared normal in situ. The great omentum deeply stained, free and shreddy. There was an aneurism about as large as a hen's egg in the anterior mesenteric artery, just as it is given off from the aorta. At the bifurcation of the right branch there was a clot of blood about the size of an apple, dark in color and somewhat adherent to the mesentery and vessels. There were no necrosed parts of the intestine. The other organs of the body were healthy.

HEMORRHAGE AT THE BASE OF THE BRAIN.—Subject, a black gelding, 1500 pounds weight and 9 years old, the property of a large cartage company in this city.

History.—The horse was doing his usual work, and apparently in his usual health. He was in the habit of balking. Just before his death he stopped suddenly and refused to move. The driver plied the whip. The horse reared, fell backwards and struck his head against the curbstone, expiring almost immediately.

Autopsy.—Made fifteen hours after death. There were no external lesions to be seen; no bruising of the tissues about the pole; no fractures to be detected. On opening the abdomen the contents were found to be normal, the thoracic organs healthy, both auricles empty, a small amount of blood in ventricles of bright red color and not clotted; valves normal, blood vessels normal. On removal of the brain the meninges were seen to be considerably congested. At the base a large blood clot extended from one and one-half inches in front of the optic chiasma anteriorly, to the anterior border of the pons varolii posteriorly, and was bounded lateraly by the external borders of the crura cerebri. Branches extended along the course of the vessels to the border of the cerebral hemispheres, and upwards along the course of the choroid plexuses to the lateral ventricles.

This clot lay between the pia mater and the substance of the brain.

There was a second clot extending from the medulla some two or three inches down the cord.

The lesions could not be traced. The substance of the brain appeared normal.

RUPTURE OF THE CORONARY ARTERY.—The subject was a dark bay gelding, about 15.1 hands high, 12 years of age, and of 1,000 pounds weight, with a trotting record of 2.19 without weights. He dropped dead while being jogged on the track at a six or seven-minute gait.

Post-mortem examination made within three hours from time of death. There were no abrasions of the skin; no fractures or dislocations. General condition good. Muscles hard, but perhaps a little too much adipose tissue for a trotter; no abnormal contents in the abdominal cavity; no peritonitis; intestines in situ apparently normal; other abdominal organs normal. On slitting up the intestine, there was seen to be some thickening of the mucous membrane of the ilium, with small hemorrhagic points here and there; the membrane in other parts of the intestine normal.

Thorax.—Upon the removal of the sternum, no fluid was present in the pleural sacs. There was an old fracture of the ninth rib on the right side in the lower part of its upper third. This was covered with an organized pleuritic exudate, but there was no adhesion to the pleural surface of the lung. This membrane was about the size of one's hand. The pericardium was greatly distended with a fluctuating, lumpy mass. On opening the sac, a quantity of clotted and partially clotted blood escaped. On enlarging the opening, the sac was found to contain some two or three quarts of clotted blood; the pericardium was normal in appearance; heart muscle firm and of normal color; lungs crepitant, dark in color; aorta empty; veins distended; pulmonary artery filled with buffy clot, not adherent. Each lung was removed separately. Heart, pericardium and twelve inches of the aorta removed together.

The clot extended for some six inches down the aorta beneath the outer coat. All the chambers of the heart were empty; walls firm; muscle substance normal; no endocarditis; no valvular lesions; walls of the aorta firm and healthy, so far as the eye could detect; no aneurism; no atheroma. There was a rupture at the base of the coronary artery, close to the sinus of Valsalva, about half an inch in length. The edges were a little ragged, but the walls seemed healthy. The brain was very well developed and of firm consistence; the cerebellum particularly well developed; the arteries at the base healthy.

A. W. CLEMENT, V. S.,
Montreal Veterinary College.

SELECTIONS FROM FOREIGN PERIODICALS.

THE CONTAGIUM OF INFLUENZA PECTORALIS. By Professor Schutz. Tageblatt der 59 Versamlung. Deutscher Natur-forscher und Arzte in Berlin, September 21, 1886.

Anatomically there are two forms of influenza seen in horses. In one there are yellow necrotic spots in the lung tissue, both in the substance of the lung and just beneath the pleura, in which lies the seat of the contagium. From the oldest spots an extension of the disease can take place to the neighboring parenchyma, and also to the pleura (spreading pleuritis). The typical pleuritis of influenza is brought about by the softening of a necrosed spot and perforation of the pleura.

The second form presents no such spots; but there is diffuse hepatization. The first form is a pneumonia multiplex mortificans, very much resembling gangrene; the second a pneumonia simplex like croupous pneumonia of man.

Examination of the necrotic spots showed them to be filled with special bacteria of oval form, mostly two together and with longitudinal fission in the broken spots, but they were sparingly distributed in the immediate neighborhood.

Artificial cultures grow best in gelatine, in the form of kernels in the neighborhood of the inoculation, only under the surface, and without liquefying the gelatine. The bacteria are identical in form and growth with those found in the lung. Mice inoculated die of septicæmia (splenitis hemorrhagia and fatty liver prominent). The bacteria are plentiful in the blood and are here surrounded by an uncolored place. Direct inoculation of cultures into the lungs killed three horses after an illness of eleven days, each time by mortifying pneumonia of the infection sort, with perforating pleuritis. An inhalation experiment on one horse did not cause death; it recovered, and showed when it died, a long time after, chronic pneumonia. This experiment will be carried out further. By the second diffuse form of pneumonia the bacteria were found in the hepatized parts. Simple and mortifying pneumonia are etiologically the same process; the contamination is continued from the spot of infection, and through diffusion becomes general. As the croup has a fibrous and a diptheritic form, so is the pneumonia of every virulence of contagion—at one time a mortifying and at another time only a fibrous inflammation. Therefore, we find in horses only one kind of pneumonia, but which anatomically and clinically show every variety of virulence of the contagium—at one time sporadic, at another epidemic,

A. W. CLEMENT, V. S.

THE CONTAGIUM OF PLEURO-PNEUMONIA. By Drs. J. Poels and W. Nolen, Rotterdam. The *Veterinarian*, March, 1887.

The outcome of the investigations and experiments may be stated as follows: A specific micrococcus always occurs in the lungs of animals affected with pleuro-pneumonia, the morphological and pathological characteristics of which are described. This micrococcus is not present in the lungs of healthy animals. Pure cultivations of these micrococci injected into the lungs of rabbits, guinea-pigs and dogs are able to produce pneumonic changes in these animals, while similar injections of central fluids have no result. Pneumonic changes are also produced by the injection of these micrococci into the trachea of dogs, and as a consequence of their inhalation by mice. Injection of the micrococci, obtained by pure cultivation, into the lungs of a bovine animal caused extensive pneumonic changes within a period of seven days. Bovine animals may be successfully inoculated with the pure cultivation above mentioned. This micrococcus is also always present in the sores resulting from ordinary inoculation. The micrococcus is not present in the malignant inflammatory swellings which often occur in inoculation.

If we now review the results of these investigations, not only each one by itself, but looking at them at the same time in their connection with each other—namely, that the coccus we have described is always found in great numbers in the exudation products of lungs affected with pleuro-pneumonia, but not in healthy lungs; that the same micrococcus is always found in the healthy reaction succeeding inoculation, and, on being developed in pure cultivations, can be successfully used for the purpose of inoculation; and, lastly, that the coccus can in a few days produce extensive pneumonic changes in a bovine animal, we think we are justified in concluding this coccus is the contagium of pleuro-pneumonia.

W. A. C.

PROCEEDINGS VETERINARY MEDICAL SOCIETIES.

PENNSYLVANIA STATE VETERINARY MEDICAL ASSOCIATION.

Annual meeting held in Philadelphia, March 14th, 1887, at the Veterinary Department of the University of Pennsylvania. President J. W. Sallade in the chair.

The following officers were elected for the ensuing year: President, Thomas B. Rayner; first vice president, W. L. Zuill; second vice president, W. H. Knight; third vice president, P. M. Minster; corresponding secretary, Alexander Glass; recording secretary, Robert Gladfelter; treasurer, J. C. Fly; trustees, J. C. Michener, W. H. Hoskins, T. B. Rayner, W. S. Kooker, R. S. Huidekoper.

Dr. Hoskins then presented the following draft of a bill to regulate the practice of veterinary medicine in the Commonwealth, which received the approval of the association:

AN ACT TO REGULATE THE PRACTICE OF VETERINARY MEDICINE AND SURGERY IN PENNSYLVANIA.

SECTION I. *Be it enacted by the Senate and House of Representatives of the Commonwealth of Pennsylvania, in General Assembly met, and it is hereby enacted by the authority of the same,* That every person who shall assume, or use, or cause to be used, any title pertaining to the practice of Veterinary Medicine or Surgery, or any of the branches of Veterinary Medicine or Surgery, shall be a graduate of a legally-chartered Veterinary College or University, having the power or authority to confer the degree of Veterinary Surgeon or analogous title; except as provided for in SECTION II. And such practitioner shall be required to register in the book kept for that purpose, in the Office of the Prothonotary of the County in which he resides.

SEC. II. Any person who has assumed the title of Veterinary Surgeon or analogous title, in this Commonwealth, for the five years preceding the passage of this Act, without being entitled to the degree of Veterinary Surgeon or analogous title, shall be allowed to continue the use of the title; but such person shall appear before the Prothonotary of the County in which he resides and make affidavit of that fact; he shall then be recorded as an "existing practitioner."

SEC. III. The Prothonotary shall purchase a book of suitable size, to be known as the "Veterinary Medical Register" of the County, and shall set apart one full page for the registration of each practitioner; and, when any practitioner shall die or remove from the County, the Prothonotary shall make a note of the same, and shall perform such other duties as are required by this Act.

SEC. IV. Every practitioner who shall be admitted to register shall pay to the Prothonotary the sum of one dollar; which sum shall be compensation in full for registration. The Prothonotary shall give a receipt for the same, and such registration shall take place within six months from the passage of this Act.

Sec. V. Nothing in this Act shall be so construed as to prevent any Veterinary Surgeon (if legally qualified to use the title) from using the title of "Veterinary Surgeon" or analogous title in this Commonwealth; but if such Veterinary Surgeon opens an office or uses the title for the transaction of business, he shall be deemed a "sojourner" and shall conform to the requirements of this Act.

Sec. VI. Any person who may desire to commence the practice of Veterinary Surgery or Medicine, or any of its branches, in this State, after the passage of this Act, and who holds a Veterinary diploma, issued, or purporting to have been issued, by any Veterinary College or University in this State, another State or foreign country, shall make affidavit before the Prothonotary that his diploma has been regularly issued by a legally-chartered Veterinary College or University, after which such person will be allowed to register as provided for in this Act.

Sec. VII. Any person who shall present to a Prothonotary a Veterinary diploma which has been obtained fraudulently; or which is, in whole or in part, a forgery; or shall make affidavit to any false statement, intended to be filed or registered; or shall use the title of Veterinary Surgeon or analogous title, without conforming to the requirements of this Act; or shall otherwise violate or neglect to comply with any of the provisions of this Act, shall be deemed guilty of a misdemeanor, and, on conviction, shall be punished for each and every offence, by a fine of one hundred dollars—one-half to be paid to the prosecutor and the other half to be paid to the County; or shall be imprisoned in the County jail of the proper County for a term not exceeding one year, or both or either, at the discretion of the Court.

A committee on legislation was appointed, consisting of Drs. W. H. Hoskins, W. S. Kooker, W. L. Zuill, R. S. Huidekoper, C. C. McLean, M. Recktenwald, James B. Rayner.

Dr. Hoskins read a paper on Azoturia, which called forth, from Drs. Michener, Zuill, Recktenwald, Hart and Huidekoper, a short discussion on the pathology of this disease, which showed that our knowledge of its exact pathology is yet in an unsatisfactory condition.

Dr. Glass presented a paper on the use of lanoline as a base for ointments, and claimed for it unusual properties of absorption.

Dr. Huidekoper presented a complete set of lesions of farcy glanders from a case which had been brought to the hospital, asking for treatment, after having been in the hands of a quack of the town, and under treatment for six months. Attention was urgently called to the necessity of proper legislation upon this subject in Pennsylvania, as the Commonwealth is at present entirely destitute of any laws which provide for the suppression of the disease or for the destruction of the animals affected.

Dr. McLean presented the outline of a bill now before the State Legislature, which provides that all stallions which stand for service in the

State shall pay a license fee of fifty dollars and be registered; shall not be registered without a certificate of soundness (from hereditary vices) from a qualified veterinarian; also, that the owner of said horse shall have a lien on mare and foal for service money during a period of nine months after foaling. After some short discussion, this bill received the approval of the association. The approval was also given to a bill now before the State Legislature which appropriates $100,000 to the Veterinary Department of the University of Pennsylvania for the completion of its buildings and laboratories.

A petition was signed by the officers and all members present.

Adjournment until the semi-annual meeting in Pittsburg, the second Tuesday of September, 1887.

THE UNITED STATES VETERINARY MEDICAL ASSOCIATION

Held its semi-annual meeting Tuesday, March 15th, in the amphitheatre of the veterinary department of the University of Pennsylvania.

The comitia minora met at 10 A. M.

The regular session was called at 11 o'clock. The present officers of the association in their chairs: President, A. F. Liautard; vice president, William L. Zuill; secretary, C. B. Michener; treasurer, James L. Robertson.

The report of the comitia minora was first read.

Dr. Michener gave notice that he would offer at the next meeting an alteration of the constitution and by-laws making it imperative that in future all applicants for admission be graduates of recognized colleges.

The following names were presented by the Board of Censors and added to the roll of members: W. H. Martinet, Baltimore; James A. Walrath, New York; Robert C. Jones, Port Jefferson, R. I.; C. Saunders Breed, D. D. Lee, K. Winslow, and E. C. Beckett, Massachusetts; Thomas Bland, Connecticut; George G. Van Mater, Brooklyn; W. E. Cuff, New York; William Rose, Staten Island; T. S. Bütler, Ohio, and Dr. Harris, New York.

The library committee failed to report.

Dr. Huidekoper presented, on the part of the committee of intelligence and education, a report from Dr. McInnes, of South Carolina, who stated that the office of veterinarian had been added to the State Board of Agriculture, with a minimum salary, which required twelve tours of the State to be made each year. If more are required, compensation is per diem. There is no veterinarian in the State except the member of the committee.

Dr. Paqnin's report from Missouri stated that more veterinarians were needed there who at the moment of their graduation knew more of anatomy, physiology, and especially pathology of cattle, hogs and sheep. This State had recently established an experimental laboratory.

Dr. W. J. Coates reported from New York the advance made by the passage of a bill regulating veterinary practice, the active interest by some members of the board of health of New York in suppressing contagious diseases which can be communicated to man through the meat and milk, also the increased number of students attending the veterinary colleges.

Dr. Huidekoper reported a diminished number of the lower order of irregular practitioners in Pennsylvania; during the last few years, while the number of qualified veterinarians is increasing, the formation of a State Society within the last two years and the foundation three years ago of the present place of meeting. He reported also the utter lack of laws to protect from contagious diseases, except for contagious pleuro-pneumonia. Of these, glanders and tuberculosis were prevalent throughout the State.

Dr. Hoskins read a report on a uniform standard of examination by the veterinary colleges of the country. The report stated that there is a general desire among the veterinarians and veterinary instructors in different parts of the country in favor of both a uniform and a high standard.

Dr. William L. Zuill, chairman of the committee on contagious diseases, read a report in which he showed that pleuro-pneumonia and tuberculosis prevail in some States to an alarming degree, and that hog cholera and chicken cholera are greatly on the increase.

The meeting then adjourned to an upper room, where a lunch was provided.

In the afternoon session a bill for the benefit of army veterinarians was read by Dr. Pendry, and he was appointed a committee of one to carry it to Washington, and $100 was appropriated to meet his expenses.

Most of the session was occupied by an exhaustive discussion of the subject of pleuro-pneumonia.

Last year a bill was prepared for Congress, which provided for an appropriation of $500,000 to exterminate the disease. At the meeting last fall the association saw the feasibility of changing its form. It was presented, but two medical gentlemen, basing their views on inoculation as relating to the human system, made sworn statements which rendered it necessary to change the form of the bill very materially. Dr. Salmon, Chief of the Animal Bureau at Washington, had prepared everything for the complete annihilation of the disease, but was unable to proceed because of the interference.

Dr. Salmon, Dr. McEachran, president of the Montreal Veterinary Association, McLean, Miller, Winchester and Osgood discussed the subject from every standpoint, and the following resolution was ultimately adopted:

"That the association is convinced that inoculation for contagious pleuro-pneumonia is inapplicable and should not be adopted, and that no animals should be placed in the infected stables until thorough disinfection has taken place; also, that all animals exposed to or having the disease shall be destroyed."

Action was taken by the association looking to the passage of an act by Congress providing for the proper organization of the Veterinary Commission of the United States Army. This act provides for a Chief, with the rank and pay of Colonel; six Inspecting Veterinarians, with the rank and pay of Captain, and forty assistants, with the rank and pay of Lieutenant.

Dr. D. E. Salmon, of the Bureau of Animal Industry at Washington, spoke of tuberculosis in animals, and said that fully 125,000 to 150,000 human lives were lost every year through the use of milk and meat from tuberculous cattle.

After a continued discussion of the topic, a resolution was adopted calling the attention of the Boards of Health throughout the country to the danger of the disease, and the necessity of rigid and complete inspection of all milk dairies and slaughter-houses, by qualified veterinarians, who should be attached to each Board of Health.

MONTREAL VETERINARY MEDICAL ASSOCIATION.

The regular fortnightly meeting of the Montreal Veterinary Medical Association was held in the lecture room of the college on Thursday evening, the 17th inst., at 8 P. M., Professor T. Wesley Mills, second vice-president, in the chair. A case of paralysis in an aged mare was reported by Mr. W. F. Torrence. This elicited from Drs. Mills and McEachran some interesting explanations and comparisons with reference to paralysis in man and animals, Dr. Mills pointing out the fact, that in man it was often due to blood pressure, and he appreciated Dr. McEachran's remarks on its comparative rarity in the lower animals, which he explained might in part be due to the longer retention of tonicity and elasticity in the blood-vessels of animals. In this respect an old dog would compare with a young child.

Mr. C. R. Simpson "Student," read a very interesting paper on "Hog Cholera variously known as Pneumo-Enteritis," "Pig Typhoid" "Swine Plague" etc., etc.,

He said that as yet very little was known of the nature and treatment of the disease, notwithstanding the investigations of very able men on the subject. He believed the disease to be a contagious and infectious eruptive fever, and, it was undoubtedly due to a specific germ. That animals inoculated either with cultures or with exudations direct, presented symptoms identical with those seen clinically.

It was fully as prevalent where hogs run loose in pastures, as where they were confined. Quarantine laws providing for the slaughter of diseased animals and governing the movements of suspected animals, should be rigidly enforced. It was the duty of the inspector, however, to be pretty certain of his diagnosis, as the disease may be compounded with sporadic pneumonia, catarrh, anthrax and common diarrhœa. Inoculations with the exudates seldom failed to produce the disease. While inoculations with the blood of living animals had always failed.

Injection of the virus sometimes produced the disease; in one case where the disease broke out in a drove in Massachusetts, it was found that the owner had fed his hogs on slops into which the rinds of hams had been thrown; these hams came from a part of the country where the disease prevailed extensively. The healthy hogs were isolated and the feeding of the rinds discontinued, when the disease disappeared. Inoculations with attenuated virus had not proved successful; of a drove of twenty-five so inoculated twenty-one died. The virus used in these inoculations came from M. Pasteur's laboratory. Though animals may recover under medical treatment, they never fatten as well after a severe attack. The reading of the paper was followed by an animated discussion. Dr. Clement, V.S., said that the Germans recognized in what we termed Hog Cholera two distinct diseases, and illustrated the micro-organisms peculiar to each. Dr. McEachran pointed out the great losses occasioned to the farmers in the United States, which, he said, amounted to nearly thirty million dollars annually. He described investigations which had been conducted at this college by Prof. Osler and gave some instructive information on the disease generally. Prof. Mills followed in an admirable address on the importance of scientific training and accurate knowledge on the part of those young men to whom such valuaable and important interests were entrusted professionally.

The proceedings were brought to a close with a pathological demonstration by Dr. Clement on the organs of a dog which died from distemper. He illustrated by microscopic preparations the organisms seen in the lungs and spleen.

At the regular meeting, March 3d, 1887, Mr. M. C. Baker, V. S., president, in the chair, Mr. Thomas E. Feron, student, reported a case of laminitis in a horse.

An interesting paper was read by Mr. Frank H. Miller, student, on indigestion in the horse. He stated as his opinion that insufficient pancreatic secretion was a very common cause of chronic indigestion, and quoted from Strangeway, McFayden and Foster, to support his theory. He considered flatulent colic as much more serious than the spasmodic form, both on account of the liability to rupture and because as he believed it was much more liable to be followed by enteritis. He favored the early use of the trochar, where there was much tympanitis. An animated discussion followed.

THOMAS E. FERON,
Secretary

SEMI-ANNUAL MEETING OF THE ASSOCIATION OF VETERINARY SCIENCE AND COMPARATIVE MEDICINE.

The third semi-annual meeting of the Missouri State Association of Veterinary Science and Comparative Medicine, was held at the State University, Columbia, Mo., Dec. 6th. The following members were present: Paul Paquin, State Veterinarian, Columbia; T. E. White, D. V. S., Sedalia; James Johnston, V. S., St. Joseph; A. Ronif, V. S.; H. B. Platt, V. S., and H. F. James, V. S., St. Louis. The association was complimented by the presence of Profs. McAlister and Moss, members of the medical faculty of the University. Balloting for officers for the ensuing year resulted in the re-election of Paul Paquin as president, T. E. White, 1st vice-president; Jas. Johnston, 2d vice-president; H. B. Adair, treasurer; H. F. James, secretary; H. B. Platt, C. W. Crowley, A. Ronif, censors. Prof. McAlister delivered a short and impressive speech on the importance of comparative medicine. H. F. James, of St. Louis, read a paper on pleuro-pneumonia, in which he quoted some words from a letter which he had lately received from Prof. Smith, of the Ontario Veterinary College, Toronto, Canada, to the effect that the professor believed we would be forced to resort to inoculation to successfully combat pleuro-pneumonia, and stating that from what he had seen of it in Edinburgh with Mr. Rutherford, its results were beyond the range of speculation. This opinion coming from such a widely known and eminently practical authority, carried with it due weight. The discussion which followed shifted to tuberculosis, on which subject Dr. Adair, of Kansas City, was to have read a paper. Dr. T. E. White, of Sedalia, in answer to some inquiries of Drs. McAlister and Moss, gave an instance of the transmission of consumption or tuberculosis from a diseased cow to two children who died within one year of each other. Post-mortems on the children showed tubercular lesions. There was no consumptive taint on either the maternal or paternal side as far back as the family records went. The father, who was a physician, disbelieved both in the existence of tuberculosis in cows and its transmissibility to the human being through the milk, and, although warned by a veterinarian that his family milch cow was tuberculous, would not part with her until the loss of his children forced him to order her destruction. A loathsome mass of tubercle was found in the chest, and the childless man was overwhelmed with grief at the sad results of his obstinacy. There are any number of cases equally conclusive.

Dr. Paul Paquin gave some very interesting points gleaned in his recent trip to France. The laboratory which he is getting into working order at Columbia, cannot but be of the greatest practical benefit to the State, and its utility is endorsed by every member of the association.

H. F. JAMES, Sec'y.

AMERICAN VETERINARY COLLEGE.

The twelfth Commencement exercises of the American Veterinary College took place on the 4th of March, at Chickering Hall, before the usual large gathering of friends of the institution. The following gentlemen received their degree of D. V. S. at the hands of the President of the Board of Trustees, as they were called by Professor A. Liautard, Dean of the Faculty:

T. W. Apeldorn, of Pa.
Don C. Ayer, of Kansas.
Leidy J. Backman, of Pa.
Roscoe R. Bell, of N. Y.
George C. Blaker, of N. J.
Daniel S. Breslin, of N. Y.
Andrew Hyde, of Ct.
Joseph C. Jackson, of N. Y.
James L. Kidd, of Ky.
Patrick F. Kiernan, of Mo.
Frederick Lamberton, of Mass.
John F. McGrath, of R. I.

George Bridges, of Ct.
Solomon Bock, of Wy. Ter.
Ephraim Booth, of N. Y.
Richard E. Buckley, of N. Y.
Henry Cady, of N. Y.
Andrew G. Collins, of N. Y.
Willis W. Curry, of N. Y.
John D. Deronde, of N. Y.
Henry H. Dews, of Mass.
John D. Fair, of Ohio.
William H. Fairbanks, of Mass.
Joseph R. Hammond, of N. Y.
Wilfred F. Harrison, of N. J.
John D. Hartman, of Pa.
William H. Hitchings, of N. Y.
Julius Huelson, Jr., of N. J.
William T. Miller, of Pa.
John S. Meyer, of Mo.
Oliver R. Moyer, of Pa.
Herbert Neher, of N. Y.
William H. Nice, of Pa.
William S. Ortgies, of N. Y.
Albert T. Sellers, of Pa.
John J. Shoemaker, of Ind.
Wilder D. Southwick, of Mass.
Oliver H. Tims, of N. Y.
William J. Tomlison, of Pa.
Richard L. Tucker, of West Ind.
Thomas J. Turner, of Mo.
Lewis C. Wakefield, of Vt.
George W. Werner, of Ill.
Joseph Shua, of N. Y.

The following prizes were granted as follows:

Dr. Julius Huelson, Jr., received the gold medal of the Board of Trustees for the best general examination.

Dr. Roscoe R. Bell received the set of veterinary and medical books, given by the Alumni Association, for the second best general examination.

Dr. James L. Kidd received the gold medal of the Board of Faculty for the best practical examination before a committee of veterinarians appointed outside of the Faculty.

Dr. J. D. Fair received the silver medal of the Michener prize for the best written and defended paper presented before the Class Faculty.

NEW YORK COLLEGE OF VETERINARY SURGEONS.

The thirtieth annual Commencement of the New York College of Veterinary Surgeons and School of Comparative Medicine was held at the Carnegie Laboratory. The graduating class consisted of Donald E. Watson, James McKee, Samuel Atchison and Joseph Blumental. Prof. Joseph H. Raymond, M. D., of Brooklyn, told them to what an important calling they had elevated themselves, and the degrees were conferred by President W. T. White. The valedictory was delivered by Samuel Atchison. Prizes were awarded as follows: Faculty prize for best general examination, gold medal, to James McKee; McLane prize for best junior examination, silver medal, to L. E. Simpkins; Comstock prize for best examination in anatomy, a pocket case of veterinary instruments, to Donald E. Watson; Jenkins prize for second best junior examination, $10 and a veterinary book, to A. Jerome; Hamil prize for second best senior examination, gold medal, to Samuel Atchison.

THE MONTREAL VETERINARY COLLEGE.

The Montreal Veterinary College and the Council of Agriculture celebrated the closing of the session for 1887. There was a large attendance of the pupils and their friends.

Mr. Blackwood, chairman of the agricultural committee of the Council of Arts and Agriculture, presided. There were also present Prof. McEachran, Dr. Leclerc, secretary Council of Agriculture; Mr. Casgrain, Dr. Brydon, of Boston, and Dr. Gadsden, of Philadelphia.

The students passed examinations in order of merit as follows:

Botany (D. P. Penhallow, M. A., professor)—Darling, Harris, Chapin, Vannest, Bateman, Austin, McWhinnie, Wieland, York, Simpson, Parker, Dillon, Harwood, Henderson, Mullins, Meldrum, Goddard and McCurdy.

Histology (Geo. Wilkins, M. D., professor)—Pease, Macaulay, Harwood, Baterman, York, Miller J., McCurdy, McWhinnie, Paige, Vannest, Wieland, Austin, Darling, Chapin, Harris, Simpson M., Skaife, Munro, Goddard and Henderson.

Chemistry (G. P. Girdwood, M. D., professor)—Pease, Miller J., Dawes, Macaulay, Feron, Paige, Robertson, Munro and McGarth.

Physiology (T. Wesley Mills, M. D., professor)—Torrance, McGarth, Becket, Paige, Robertson, Roberts, Miller J., Vannest, Baker, Smith, Muuro and Dawes.

Materia Medica (James Stewart, M. D., professor)—Paige, Munro, Becket, Pease, McGarth, Smith, Vannest, Macaulay, Dawes, Meldrum, Roberts and Robertson.

Cattle Pathology (Charles McEachran, V. S., professor)—Torrance, Rowat, Miller F., Simpson C. R., Feron, Murphy, Baker and Craig.

Anatomy (Mr. C. Baker, V. S., professor)—Torrance, Rowat, Miller F., Feron, Murphy and Simpson C. R., equal, and Baker.

General Pathology, practice of Veterinary Medicine and Surgery (D. McEachran, F. R. C. V. S., professor)—Torrance, Rowat, Feron, Miller, F., Simpson C. R., Baker and Metcalf.

Final oral examination by the board of examiners appointed by the Council of Agriculture, consisting of Messrs. J. W. Gadsden, M. R. C. V. S., of Philadelphia; Williamson Bryden, V. S., Boston; J. A. Couture, V. S., Quebec; Arch. McCormick, V. S., Ormstown, Que.; A. W. Harris, V. S., Ottawa; Geo. Leclerc, M. D. The following students passed: Messrs. Torrance, Rowat, Miller, Feron, Simpson C. R., and Baker.

The diplomas and prizes were distributed by Dr. Leclerc. The following gentlemen having attended the prescribed three sessions and passed the written and oral examinations in botany, physics, histology, chemistry, physiology, materia medica, anatomy, cattle pathology, general pathology and practice of veterinary medicine and surgery, received the diploma, viz.: Messrs. Torrance, Rowat, F. Miller, Feron, Simpson and Baker.

For the best general examination in all subjects, a silver medal, the gift of the Council of Agriculture, won by W. J. Torrance. Practice of veterinary medicine and surgery—1st, W. J. Torrance; 2d, A. R. Rowat. Cattle pathology, W. J. Torrance. Anatomy, W. J. Torrance.

Practice of veterinary medicine and surgery—1st, H. R. Macaulay; 2d, John Miller. Cattle pathology, Jas. B. Paige and H. R. Macaulay, equal. Anatomy, J. F. Pease. Materia medica—1st, Jas. B. Paige; 2d, M. Munro.

Dr. Brydon congratulated the Montreal Veterinary College on its high standing among the veterinary schools. "Whatever," he said, "might be gained by rushing men through a school years ago, there was nothing to be gained now, as the profession was well enough supplied with members in Canada."

Dr. McEachran, in the course of his speech, said that since the establishment of the school in 1866 it had made great progress, and its connection with McGill University gave it a position which it could not otherwise attain. In undertaking the establishment of the school he knew he would have great responsibility and he looked forward to an uphill fight. The years which had passed confirmed him in that opinion, but he meant to aim high in veterinary education and he succeeded (Applause). They had established a matriculation examination in their school and given a thorough scientific course which they might be proud of when they found young men like Messrs. Pease and Torrance taking as large a percentage as any of the medical students. In Toronto there was no matriculation needed, and when intending students saw by the course that they had to pass this examination in Montreal, it prevented one-half of them coming, and another one-third were prevented when they found they would have to pass three sessions at the school. His policy was that the national school was more honored by turning out one man who would be a credit to it than one hundred semi-illiterate men who would not be an honor to any profession.

After a vote of thanks had been proposed to the chairman the proceedings terminated.

The last meeting of the Veterinary Medical Association session was held in the college lecture room at 5 P. M., the president, Mr. M. C. Baker, V. S., in the chair.

Mr. G. W. Becket was elected secretary-treasurer and librarian for the summer months.

The following members having fulfilled the necessary requirements received the diploma of the association: Torrance, Simpson, Rowat, Feron, Miller and Baker.

Prof. T. Wesley Mills made the report of the committee appointed to examine the essays and awarded the prize, a valuable case of surgical instruments, to Mr. Torrance, the committee deciding that his was the best paper read during the session. He (Prof. Mills) said that he regretted there was not another prize, as he considered Mr. Simpson's paper to have been an exceptionally good one, and worthy of a second prize. In fact all the papers were of a very high order of merit, and were distinguished by a degree of originality not often seen in students' papers.

REVIEWS.

The Comparative Anatomy of the Domesticated Animals, by A. Chauveau, Professor at the Lyons Veterinary School. Second edition revised and enlarged, translated and edited by George Fleming, F.R.G.S., M.A.I., Veterinary Surgeon Royal Engineers. With 450 Illustrations. Price, $6.00. New York: D. Appleton & Co. 1886.

Professor Chauveau has placed both the medical and veterinary professions under deep obligations to his industrious pen, and has made a valuable contribution to comparative anatomy by giving to the world his full and elaborate treatise on this subject. The medical man, no less than the veterinarian, stands in pressing need of the knowledge which this volume supplies. Function and structure are so intimately related that no one can hope to obtain a knowledge of the former without a thorough understanding of the exceedingly varying character of the latter. Function is stable and unvarying, except in accidental details, while the anatomical structure of which it is the expression presents wide discrepancies and radical differences. The consequence is that unless we contemplate function in connection with the multitude of anatomical differences which present themselves in the animal kingdom, we fail to obtain a full comprehension of its significance and far-reaching effects. It has long stood as a reproach against physicians that their one-sided conception of function, gleaned exclusively from human sources, prevented them from fully understanding the physiological effects of remedies and the wide operation of pathological causes. It is only when function is viewed as the outcome of variable anatomical conditions that its philosophy can be comprehended. Digestion and circulation are perfect physiological processes in in the horse or the cow as they are in man, and no one can be said to understand these processes fully whose knowledge of them is confined to their occurrence in the human subject. Apparent aberrations from a normal condition of these functions are apt to bewilder the physician who knows nothing of comparative anatomy and who has no idea of analogies.

The science of comparative anatomy is our only safe guide in the study of evolution in animals and it is the source of that philosophy which exhibits to us the entire animal world as pervaded by a plan which holds it all riveted together and imparts to it an aspect of profound significance. It was the light which this science supplied that enabled Darwin to elaborate his wonderful scheme of the origin of species, and likewise enabled St. George Mivart to point out the weaknesses of that ingenious theory. In fact physiology, especially that of the nervous system, cannot now rank as a study unless it embrace in its wide grasp the facts of all animal life. Huxley, Bastian, Romanes and Luys could never have executed their grand works had they not built upon the solid ground work of comparative anatomy. The scientific world is therefore justly indebted to Professor Chauveau for his valuable contribution to this branch of study and no less perhaps to Dr. Fleming for his faithful and accurate translation. Many a student of anatomy who recalls the interest with which he listened to the explanation of rudimentary and analagous organisms, and who also recalls the scantiness of the information that reached him, cannot but feel delighted that he here finds ample means of elucidating the meaning of those wonderful co-related structures which simplify as they tend to unify the plan on which the living universe was projected. To sieze the underlying features that bind together the most widely separated species, to perceive the structural unity that pervades the organization of living beings and to trace out the dissimilarities which mark their divergence, is a work which offers the fullest scope to the efforts of the philosophical physiologist. The illustrious Cuvier and the no less distinguished Geoffroy St. Hilaire may be regarded as the originators of this interesting line of investigation, and their labors have lent a wonderful impulse to comparative physiology and anatomy. It was to the futherance of the work inaugurated by those brilliant savants that Professor Chauveau has addressed himself, and if the former laid the foundations of the science deep and broad, the latter has suitably crowned the edifice. Veterinarians can no longer plead that the anatomical side of their profession is incomplete, for Professor Chauveau's treatise has covered the entire ground of veterinary anatomy and leaves nothing for the most ardent investigator to desire. It is to be hoped that the students of both medical and veterinary colleges will appreciate the value of his labors and that his work will become a standard volume in their hands.

C. M. O'L.

AN INTRODUCTION TO GENERAL PATHOLOGY. Founded on Three Lectures Delivered at the Royal College of Surgeons, London, 1886. By John Bland Sutton, F.R.C.S. Price, $4.50. P. Blackiston, Son & Co., Philadelphia. 1886.

Mr. Sutton's aim in these lectures is to apply certain general truths of biology to certain classes of the facts of pathology. Three principles have been propounded by Professor Huxley, as follows: 1, There has been an excess of development of some parts in relation to others; 2, Certain parts have undergone complete or partial suppression; 3, Certain parts which were originally distinct have coalesced.

In illustration of these, the author presents from comparative pathology a mass of examples of original observation, many of them remarkable and *bizarre.* "Excess of development" and hypertrophy are illustrated by hypertrophy of one kidney and atrophy of the other in birds; by the overgrowth of horns, nails and teeth. Atrophy, so frequently correlated with hypertrophy, is expounded by cases testifying to much excursiveness of research; illustrations are taken from embryology, zoology and human anatomy. An interesting example of atrophy in the embryo, observed by Professor Parker in the green turtle, is given. "Parker found that in the embryo of his third stage, about six and a half lines long, fifty-one somatomes exist, but in the adult forty-one vertebræ only are found. The number of somatomes in the dorsal, lumber and sacral regions is equal to the number of vertebræ in the adult, but in the cervical region seven somatomes abort, and in the caudal region three. This singular suppression of parts in the embryo suggests an ancestry with longer necks and tails than are found in the forms which now exist."

Some extraordinary facts are adduced, showing correlated developmental excess from atrophy of the ovaries. When in females the offspring-bearing period of life has passed there is a dwindling of the organs of generation and correlatively an assumption of masculinity. The growth of hair on the face in old women is familiar to everyone, but the following examples are novel and wonderful. Youatt "had an opportunity of examining seven hen pheasants in plumage more or less resembling the male, and in all of which the sexual organs were diseased, but with some variation as to extent. The ovary was contracted in size, of a purple color, and hard to the touch. The oviduct was diseased throughout its whole length." The following case of a female golden pheasant was observed by the author. "A pair of birds, male and female, were given to the society by Sir H. W. Tyler, M. P., but the hen bird presented all the resplendent dress of the male bird, even to a slight yellow coloration on the legs. The ultimate fate of the bird was rather tragic, for in the spring of 1885 she would not yield to the solicitations of the male, and he killed her. The post-mortem examination showed the ovary dwindled to the dimensions of a pea."

Chapter IV is on the correlation of organs. Mr. Sutton espouses the doctrine that division into sexes in animals has been brought about by relatively excessive function of one or the other set of procreative organs in hermaphrodite individuals, hermaphrodism being regarded as the primitive sexual condition in the evolutional history of animals. The exclusive use of one set having led to the other becoming obsolete. This is a beautiful example of the working of the principle of the correlation of hypertrophy and atrophy.

The author defines inflammation as "the method by which an organism attempts to render inert noxious elements introduced from without or arising from within." In dwelling at considerable length on the power possessed by the leucocytes of inflammation to digest and dispose of noxæ, mention is called to the recent work of Metschnikoff on intracellular digestion. The story of inflammation is "likened to a battle.

The leucocytes are the defending army, their roads and lines of communications the blood-vessels. Every compositic organism maintains a certain proportion of leucocytes as representing its standing army. When the body is invaded by bacilli, bacteria, micrococci, chemical or other irritants . . . . . the leucocytes rush to the attack. In the conflict cells die and often are eaten by their companions ; frequently the slaughter is so great that the tissue becomes burdened by the dead bodies of the soldiers in the form of pus."

If we may be permitted a gentle criticism here, this does not, it appears to us, set forth any new conception, in the scientific sense, of the process of inflammation. It is a purely human though interesting way of looking at the facts ; it does not as a scientific concept should "take and lay hold of on all sides" all the essential phenomena. How large an anthropomorphic element there is in the notion is seen in its want of correspondence with nature. The cause of inflammation may be something which it is impossible for leucocytes to devour, as the electric current, or thermal vibrations. If it be said that the function of leucocytes is to eat up their own dead, it may be replied that death of tissue elements is not essential to inflammation. The necessary lesion is in the vessels ; other phenomena, as the exudation of leucocytes, being largely secondary. Also the process of recovery or resolution may, in slight inflammations at least, take place quite independently of the action of leucocytes. It is scarcely legitimate to speak of leucocytes as acting with conscious, or instinctive, or reflex intelligence ; these are the attributes of nerve tissue, though, doubtless, they are forshadowed in the seemingly intelligent actions of simple protoplasm. A rational and philosophical explanation of inflammation must be made in the terms of physics.

We have not space for a detailed notice of remaining chapters. Cystomata and neoplasms are considered with a remarkable fullness of new knowledge and many dark places in the pathology of new formations are brightly illuminated. The author has rendered a very important service to pathology by publishing this record of his exceptional experience. Since 1878 he has systematically examined 12,000 animals from fish up to man.

C. P. M.

DELL IDENTITA DELLA TISI PERLACEA DEI BOVINI COLLA TUBERCULOSI UMANA E DELLA SUA CONTAGIOSITA. G. Nuvoletti, Drucker and Tedeschi, Verona and Padova, 1887.

This recent Italian contribution to the literature of tubercular diseases is well timed and interesting. It is not many years ago since public opinion was in a state of complete lethargy respecting the transmissible character of these diseases, and, though some earnest spirits contended that it was a question intimately connected with public health, the matter remained practically in abeyance and no steps were taken to protect the human species or the lower animals from the danger of contagion.

The advances made in microscopy, however, together with the astonishing strides taken in bacteriology, have drawn earnest attention to the contagious character of tuberculosis and to its communicability from one species to another. The rapid and alarming spread of tubercular maladies has indeed filled men with apprehension, especially as all recorded attempts to put a stop to its ravages had proved completely ineffectual. So appalling had become the severity of this scourge, especially in large cities and crowded centres of population, that its victims were counted by the hundreds of thousands, and epidemics paled into insignificance beside its destructiveness. Ringel has said: "It is impossible to foresee what will be the condition of humanity in a very short time unless some effective measures be adopted to stem the inroads of this tide which threatens to engulph the entire human family."

The treatise, title of which heads this notice, addresses itself intelligently to the consideration of these two questions: 1st. Is the peculiar phthisis of horned cattle identical with human tuberculosis?

2d. Is this same phthisis communicable from one individual to another who use the flesh and milk of tubercular cattle. To both these questions an affirmative reply is given and abundant data have been gathered from all sides to constitute an ample and convincing proof.

As far back as 1865 Professor Villemin in a communication sent to the Paris Academy of Medicine proved that the inoculation of tubercular matter resulted in the transmission of the disease from one zoological species to another and that the same order of phenomena was observed as attended the transmission and development of all virulent maladies. Experiments simillar to those of Villemin were conducted from time to time by Herard and Cornil in France, by Perroncito in Turin and by Pavaskera and Tallonis in Greece. The experiments of Chauveau, however, were the most complete and satisfactory, so that no doubt longer lurks in the minds of the most skeptically inclined touching the ready transmissibility of tubercular diseases by innoculation. Experiments to the same effect were made and continued by Haselbach, Scholz, Klebs and Colin from which the following valuable conclusions have been deduced:

1st. Bovine tuberculosis is absolutely infectious.

2d. Tubercular matter taken from the other organs of the body do not possess the same degree of infectiousness as that taken from the lungs.

3d. Infection can take place both by inoculation and by the ingestion of infected material.

4th. There can be no doubt as to the identity of bovine phthisis with the human tuberculosis.

5th. That the flesh of animals affected with tuberculosis possesses, though in a less degree, the same infectious qualities as tubercular matter itself.

6th. That boiling destroys the infectious principle; but that even after boiling tubercles continue to possess a certain amount of virulence, just as in the case of trichinosis.

7th. That the infectious character of the milk of tubercular cattle has been incontestably established.

These conclusions possess a wonderful significance and should be seriously taken to heart by sanitary veterinarians.

It is evident that the stamping out process cannot be too rigorously enforced; that suspected cattle should be immediately slaughtered, scrupulous cleanliness observed and such hygienic measures put in operation as are calculated to keep the health of cattle *in transitu* up to the highest standard; considerations of general economy and human health demand nothing less. C. M. O'L.

BOOKS AND PAMPHLETS RECEIVED.

STUDIES FROM THE BIOLOGICAL LABORATORY, Johns Hopkins University, edited by H. Newell Martin and W. K. Brooks. Vol. III., Nos. 8 and 9, Johns Hopkins University Circulars. Baltimore.

ANNALS ET BULLETINS SOCIETIE DE MEDECINE DE GAND. Ghent, Belgium.

PROCEEDINGS NEWPORT NATURAL HISTORY SOCIETY, 1885–86.

SCOTTISH AGRICULTURAL GAZETTE ALMANAC contains an article on Pleuro-Pneumonia by Principal Thomas Walley. Edinburgh, 1887.

PRESIDENT'S ADDRESS, TENTH ANNUAL MEETING OF THE DETROIT MEDICAL AND LIBRARY ASSOCIATION. By C. J. Lundy, A. M., M. D.

THE TRUE RELATIONS OF THE VETERINARY PROFESSION TO THE LIVE-STOCK INTERESTS OF THE STATE. By Frank S. Billings, D. V. M.

STERILITY, MANAGEMENT OF THE SECUNDINES AND REPORT ON DISEASES OF THE RECTUM. By Joseph M. Mathews, M. D. Louisville. 1886.

CLASSIFICATION OF THE MACROCHIRES. By R. W. Shufeldt, M. D.

CONTRIBUTIONS TO SCIENCE AND BIOGRAPHICAL RESUME OF THE WRITINGS OF R. W. SHUFELDT, M. D., Captain Medical Department, U. S. A., 1881–1887. L. S. Foster, New York, 1887.

THE DIETETIC ANNUAL FOR 1887. Published by Wells, Richardson & Co.

UBER WIRKUNG, therapeutischen werth und Gebrauch des neuen Karlsbader Quellsalzes, nebst dessen Beziehung, zum Karlsbader thermalwasser, Von Dr. W. Jawoiski, Wein, 1886.

COOPER MEDICAL COLLEGE, San Francisco, annual announcement, Session 1887.

ANNUAL REPORT OF MORSE DISPENSARY OF COOPER MEDICAL COLLEGE, 1886.

BIENNIAL REPORT OF THE STATE BOARD OF HEALTH OF THE STATE OF WEST VIRGINIA, 1885–'86.

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ORIGINAL COMMUNICATIONS.

ART. XX. A CRITICAL COMPARISON OF A SERIES OF SKULLS OF THE WILD AND DOMESTICATED TURKEYS.

(*Melegris gallopavo mexicana and M. domestica.*)

BY R. W. SHUFELDT, C. M. Z. S

Captain, Medical Corps, U. S. Army.

As one would surely have predicted beforehand, Mr. Darwin, when he came to compare series of skulls of the numerous varieties of the domesticated fowls, with the skull of *G. bankiva*, and similarly, skulls of a number of species of tame ducks with the wild duck, found some very striking differences among them. So far as I have been able to ascertain, however, he never compared the skulls of the tame and wild turkeys; and so far as his comparisons of fowls and ducks are concerned, I believe they are principally intended to show the great variation that has taken place in these parts, and the marked departures from the wild type in the case of the fowl and duck, respectively.

Indeed, it would be difficult I imagine, unless one could secure skulls from an entire line of fowls showing the gradual changes in them as they descended from the parent wild stock, to demonstrate anything else. The same remark applies, of course, to the ducks. I am not aware that any such a seriès has ever been made, with the view of pointing out these interminate variations, as they must have occurred in some of the breeds. It would not be difficult, however, to picture to our minds the shading differences that would take place in the skulls in a line of fowls extending between *G. bankiva*, and, for instance, a white-crested Polish Cock.

With respect to the turkeys we have some very interesting data to start from, and of such a character, I think, that when taken in connection with the facts that I intend to present in this paper, it will lend some additional light to certain phases of this question.

In the first place, our ornithologists now recognize two well-defined species of wild turkeys in the avifauna of the United States, viz : *M. gallopavo*, and *M. g. mexicana:* then there are in this country alone, several very well-marked varieties of the domesticated turkey. So there seems to be no reason but that by careful selection and breeding we might not in time have quite as many varieties of turkeys as we now have of chickens, and presenting the same extraordinary differences in form and plumage.

Further, to quote quite extensively from Mr. Darwin's "Animals and Plants under Domestication," (Vol I, pp. 352-355), and omitting the authorities from whom he derived some of his information, we find that: "It seems fairly well established by Mr. Gould, that the turkey, in accordance with the history of its first introduction, is descended from a wild Mexican species (*Meleagris mexicana*) which had been already domesticated by the natives before the discovery of America, and which differs specifically, as it is generally thought, from the common wild species of the United States."

"Some naturalists, however, think that these two forms should be ranked only as well-marked geographical races.

However this may be, the case deserves notice because in the United States wild male turkeys sometimes court the domestic hens, which are descended from the Mexican form, and are generally received by them with great pleasure. Several accounts have likewise been published

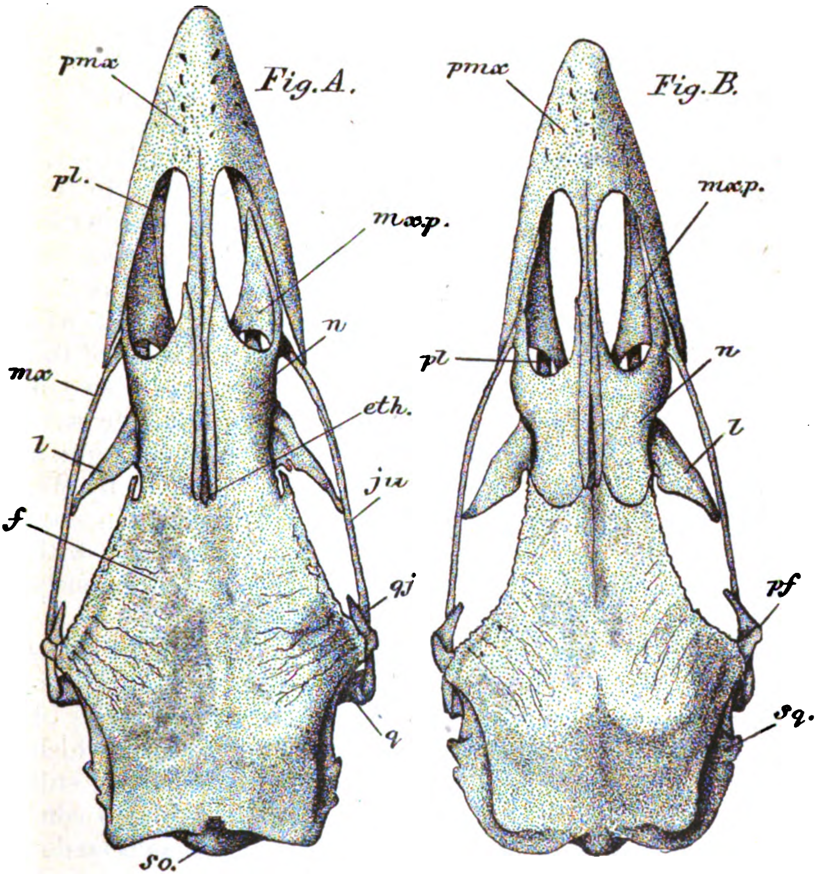


Fig. A. Superior aspect, life size, of a skull of a wild turkey. *M. g. mexicana.*

Fig. B. The same view of a skull of the domesticated turkey, also life size. Drawn from adult specimens by the author, and mandibles removed in each case. *pmx*, premaxillary ; *pl*, palatine ; *mx*, maxillary ; *l*, lacrymal ; *f*, frontal ; *mx. p.*, maxillo-palatine ; *n.*, nasal ; *eth.*, ethmoid ; *ju.*, jugal ; *q j.*, quadrato-jugal ; *q.*, quadrate ; *so.*, supraoccipital ; *sq.*, squamosal ; *pf.*, postfrontal process.

of young, reared in the United States from the eggs of the wild species, crossing and commingling with the common breed. In England, also, this same species has been kept in several parks; from two of which the Rev. W. D. Fox procured birds, and they crossed freely with the common domestic kind, and during many years afterwards, as he informs me, the turkeys in his neighborhood clearly showed traces of their crossed parentage * * * English turkeys are smaller than either wild form. They have not varied in any great degree ; but there are some breeds which can be distinguished, as Norfolks, Suffolks, Whites, and copper-colored (or Cambridge), all of which, if precluded from crossing with other breeds, propagate their kind only." Darwin then goes on in the same place to point out some of the marked characteristics of the other varieties, one or two of which were conspicuously crested. He concludes by saying that "In India the climate has apparently wrought a still greater change in the turkey, for it is described by Mr. Blyth as being much degenerated in size, 'utterly incapable of rising on the wing,' of a black color, and with the long pendulous appendages over the beak enormously developed."

With these facts before us, I conceived it would be of interest, if not of actual importance to compare a good series of selected skulls of *M. g. mexicana*, with a series of skulls of that domesticated form of the turkey which shows in its external characters evidences of being still closely affined to the wild stock. Then taking into consideration the number of years since this bird has been domesticated, I thought it might be possible to discover those definite characters in the skull that already showed a departure from the corresponding features in the skull of the wild turkeys. The latter are to be found in the forests within a mile of my present residence, and this gave me the opportunity, which I have availed myself of, of securing a fine series of the skulls of this form. Another series representing the variety of the tame turkey alluded to in the last paragraph, were collected for me in Chicago, by Mr. H. K. Coale, the president of the Ridgway Ornithological Club of that city; and I am under great obligations to him for the evident care he took to select the proper kind

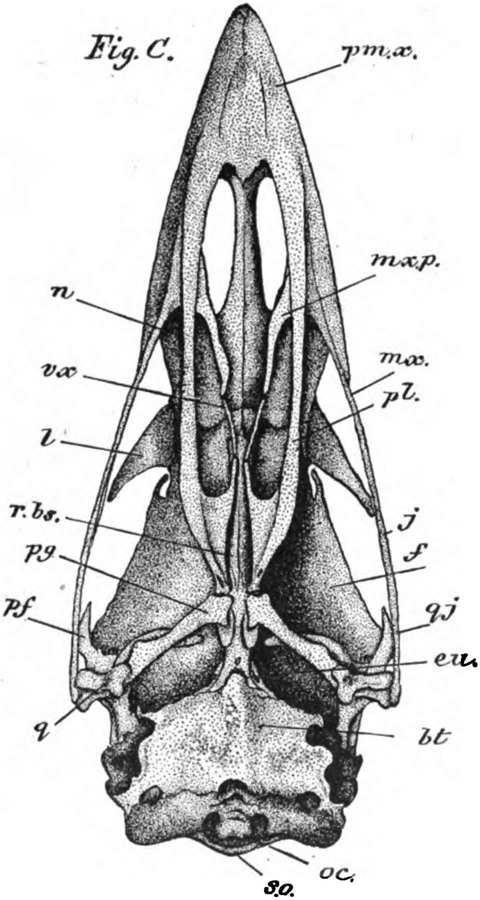


FIG. C.—Under view of the skull of *Meleagris gallopavo mexicana;* with mandible removed, Life size adult; from the same specimen shown in figure A. Drawn by the author. *pmx*, pre-maxillary; *mxp.*, maxillo-palatine; *mx*, maxillary; *pl*, palatine; *j*, jugal; *f*, frontal; *qj*, quadrato-jugal; *eu*, Eustachian tube, anterior aperture; *bt*, basi-temporal; *oc*, occipital condyle; *s o.*, supraoccipital; *q*, quadrate; *pf*, postfrontal; *pg*, pterygoid; *rbs.*, basisphenoidal rostrum; *l*, lacrymal; *vx*, vomerine ossifications; *n*, nasal.

of material. I prepared the skulls of both of these series myself, as the heads came to me in the flesh. Not being familiar with any name, as having previously been bestowed upon it by former authors, for this variety of the tame turkey, I have designated it for convenience sake, the *M. g. domestica.*

When we come to simply superficially compare the skull of one of these wild turkeys with the skull of one of the domesticated ones, we appreciate that same difference which we find upon a similar comparison to distinguish the skull of a cock *G. bankiva*, and any of the typically domesticated fowls. It seems to consist in a lightness, a pneumaticity, accompanied by a certain sharpness of the details of the skull, an angularity, if we may so express it, in the case of the wild bird, as contrasted with an evident thickness and density of the bone, together with a general mellowing down of its principal free edges, producing a certain lack of sharpness, in the case of the domesticated one.

Now to compare the details, I have chosen the skull, one from my series, of a fine adult male specimen of *M.g. mexicana*, it having all the features of a skull of a wild turkey well exemplified. This skull I have drawn life size in the figures illustrating this paper (Figs. A, C, D and F). With the same care I have selected for illustration one of the skulls of the series representing my tame turkeys, which seems to present all the salient characters seen in the skull of *M. g. domestica* (Figs. B, E and G). It was also an adult male specimen.

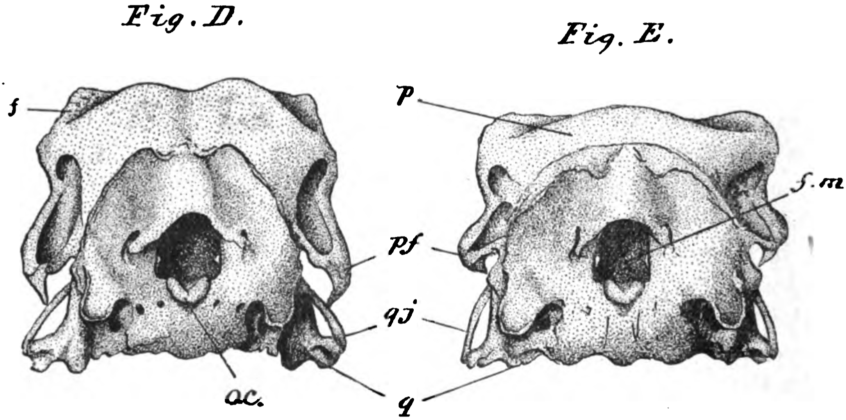
Viewing these two skulls upon their superior aspects, as shown in figures A and B, we find the form of the premaxillary bone essentially very much the same in both birds; and, I fail to find any distinctive differences among them that have any claim to constancy. It will be noticed that the backward-extending supero-median nasal process of this bone retains throughout life its longitudinal division into two slips. Between the posterior extremities of these, in all specimens that I have examined, both wild and tame, it is possible to discern the unlying ethmoid (*eth*). Coming next to the nasal bones (*n*), we find that they also have pretty much the same shape and relation in the two skulls under consideration. I have always noticed, however, that in the skulls of wild turkeys, the *posterior borders* of the nasals indistinguishably fuse with the adjacent frontals, and in them this fronto-nasal region is more concaved than it is in the skulls of the domestic turkeys. There is one skull of a tame turkey in my series, and but one, that shows this absorption of the fronto-nasal suture. But this skull also exhibits other features that partake more or less of the characteristics of the skull of a wild turkey.

I am inclined to think that it will be found though, that the persistency of this suture in the skull of adult tame turkeys, marks one of those differences that will eventually become one of its established distinctive characters. And here it will be as well to remark that the fusing of those bones of the skull that commonly have the sutures among them obliterated in adult life, takes place, as a rule, at a much later date in domesticated turkeys, than it does in the wild birds. It is not an uncommon thing to find the bifrontal suture present in old barn-yard gobblers. What I have said in regard to the premaxillary and nasal bones, is well shown in figures A and B; we may also see there the usual form assumed by the lacrymal (*l*), which latter is a largely developed element of the skull in all turkeys. In the vast majority of skulls of both species this bone articulates with the external free edge of the posterior moiety of the corresponding nasal; it may, however, in either species, slightly encroach upon the adjacent frontal bone. Its horizontal portion seems to be longer and more pointed in wild turkeys, than in the tame ones; we will probably find numbers of exceptions to this rule, however, but a still more constant character is to be found in the descending portion of the bone, which is evidently much longer, and more conspicuous in the former than it is in the latter species.

Passing now to the fronto-interorbital region, it is the rule so far as I have examined, that the transverse diameter here is manifestly greater in the wild turkey than it is in the domesticated bird; while, as I have already stated, the fore part of this region is more sunken in the former fowl. Posterior to the frontal area again, we find the parietal prominences better marked in wild turkeys than they are in tame ones.

There are two other well-marked and comparable characters upon this aspect of these skulls, but as they can be better appreciated upon the lateral view, I will defer their discussion until we come to consider that part of our subject.

Let us now pass to the posterior views of these skulls, as shown in figures D and E; and, beginning from the top, we observe the more prominent parietal prominences in the wild turkey, over the evenly-rounded, corresponding region of the domesticated one. The principal feature, however, to be taken into consideration upon this aspect of the skull is, what I please to call here, the *occipital area*. By the occipital area I mean that space so definitely circumscribed upon this face of the cranium by the bounding occipital ridge or line. In a great many birds the general form of this area, constitutes upon comparison a very good character. The rule here is, that in the tame turkey this area is decidedly more rounded than we ever find it in the wild



Rear views, life size, of the skulls of the wild (Fig, D) and tame (Fig. E) turkeys. *f*, frontal bone; *p*, parietal; *pf*, postfrontal process. *qj*, quadratojugal; *q*. quadrate; *fm*. foramen magnum; and *o. c.*, occipital condyle. In both specimens the mandibles have been removed.

one, although we occasionally observe in the former that it assumes the cordate outline which, so far as my researches carry me, is invariably the case in *M. g. mexicana.*

Little or no difference seems to distinguish the form of the occipital condyle among these fowls, for both in tame and wild turkeys, we find the notch at its middle point above to be deeply cleft in some cases, whereas in others it is barely perceptible.

The occipital bone as a whole is thicker and apparently denser in the tame turkey than it is in the wild one, but as to the relative size of the brain cavities, I would prefer to measure a much larger series of skulls than I now have at my disposal. I would say, though, that little if any change has taken place in this particular; and to accurately decide upon this important point, at least a hundred skulls for either species should be carefully measured, averaged and compared. If this ever be undertaken I simply predict that the result will show that the average capacity of the brain cavity will be found to be rather larger in the wild turkey than it is in the tame one, contrary to the usual rule following domestication, I believe.

Upon lateral view of these two typical skulls we find for comparison but three points that demand our special consideration; these are, *the arch of the superior margin of the orbit; the depth of the parietal region;* and, *the interorbital septum* (Figs. F and G).

First, as to the arch of the superior margin of the orbit, we find this more elevated, and, as it were, more convexed in the wild than it is in the tame turkey, where this arc is depressed, long and shallow, and but slightly raised above the plane of the frontal region.

Another very well marked character and one rarely departed from, is the depth of the parietal region; what I mean by this is the distance measured on a median longitudinal line from the parietal prominences to the occipital ridge. This line is proportionately much shorter, and less horizontal in the wild turkey than it is in the domesticated one. By the aid of this character alone, I believe I could in a mixed collection of these two species of turkey, correctly pick out the skulls of the vast majority that belonged to either kind. This difference is indicated by x in Figs. F and G.

As to the condition of the interorbital septum I would say that, in all the specimens of *M. g. mexicana*, which I have examined, this bony plate is entire and of considerable thickness. I have found this to be the case in but one instance in the series of skulls of the tame turkeys at my command, while in all the others of this latter species an irregular vacuity of some size exists in it (Fig. G, *ios*).

Before passing to the consideration of the characters at the base of the skull, it would be as well to state that the skulls of wild turkeys differ as a rule from each other but very little, and only to an extent due to the usual variance of each individual skull, whereas in a series of these specimens chosen from the domesticated turkey, we occasionally find a skull which in its several details more closely approaches the average skull of the wild bird.

Now at the base of the skull I fail to find any constant differences in the basitemporal area of the two series, or in the quadrates; or the infraorbital bars: the palatines; the basis, basisphenoidal rostrum; the maxillo-palatines; or in the under side of the premaxillary, this last bone having already been alluded to.

In the case of the *pterygoids*, however, I think it will as a rule be found, that in the wild species they are rather longer and slenderer than in the skull of the average tame turkey. Certainly it is so in the specimens before me. Although not showing any distinctive difference between the two varieties, for it appears to be equally well developed in both series. I have found the "vomerine ossifications" the most interesting features at the base of the skull of these turkeys.

According to the bibliography of Professor Elliott Coues, Owen published in 1837 in P. Z. S., a paper entitled a "Dissection of the Head of the Common Turkey (*Meleagris gallopavo*)" comparing it at the same time with the head of the *Cathartes aura*. This contribution is not available to me at the present writing, and I am unable to say whether

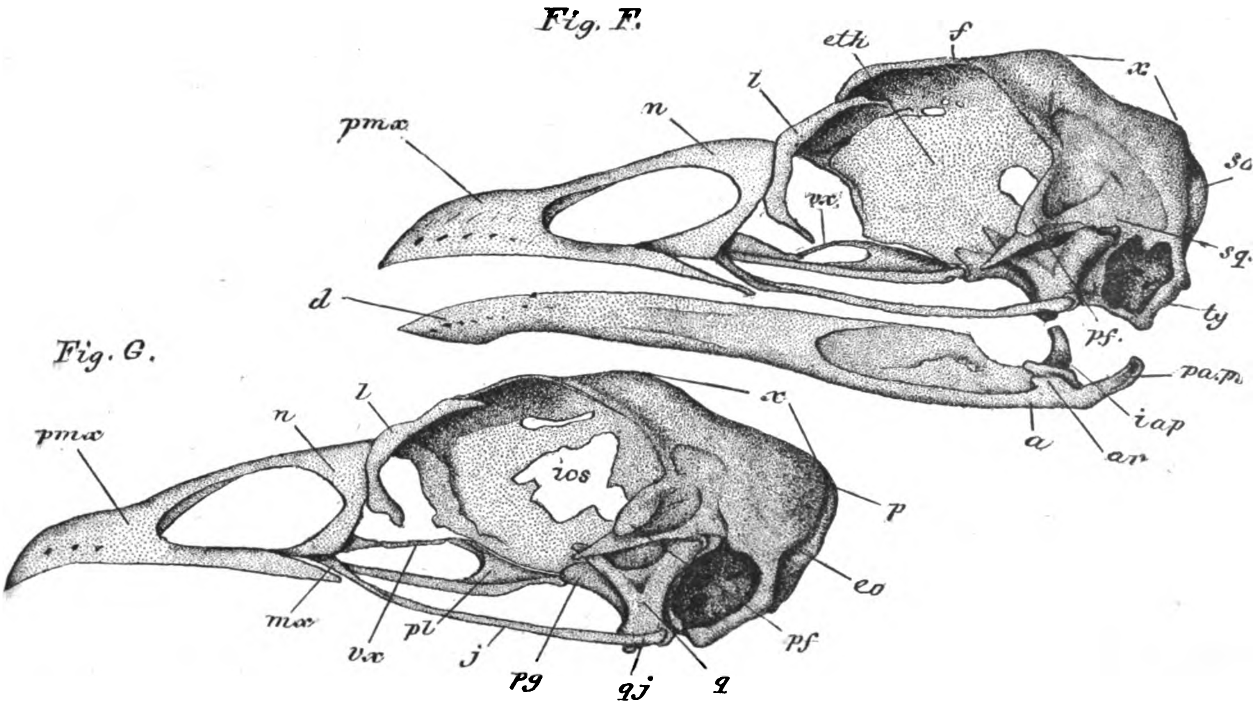


Fig. F.—Left lateral view of skull of *M. g. mexicana*, including the man dible. Life size and the same skull as shown in the other figures.

Fig. G.—Left lateral view of the skull of a domesticated turkey; life size and the same one as in other figures—its mandible is not drawn, *pmx*, premaxillary; *n*, nasal; *eth*, ethmoid; *l*, lacrymal: *f*, frontal; *x*. the length of parietal region; *so*, supraoccipital, *sq*, squamosal; *ty*, tympanic cavity; *pf*, post frontal process; *vx*, vomerine ossifications; *d*, dentary; *pa. p*, posterior angular process; *i. a. p*, internal angular process; *ar*, articular: *a*, angular; *d*, dentary; *p*, parietal; *eo*, exoccipital; *q*, quadrate; *qi*, quadrato-jugal; *pg*, pterygoid; *j*, jugal; *ios*, interorbital septum: *pl*, palatine; *mx*, maxillary.

Professor Owen passed any remarks in it upon the *vomer* or not.* I am not familiar with any other memoirs devoted especially to the anatomy of the *Meleagris*, and passing over the many recent text-books and memoirs referring to fowls, by the Parkers, Huxley, Claus, Bell and others, I take the statement of the author of the article "Birds" in the ninth edition of the Encyclopædia Britannica as final authority on the subject, and he says that "In the *Gallinaces*, as in the desmognathous *Rapaces*, the vomer is single; in Pigeons and Sand-Grouse it is absent."

Now the facts presented below are based upon careful dissections of mine of the heads of eleven turkeys in the flesh, of (the two kinds under consideration), with the view of determining the condition of the vomer, alone. Some of these investigations were made upon the heads while they were absolutely fresh; others had been a short time in alcohol; while still others were either parboiled, or had been submitted to prolonged though careful maceration. In all the cases the structures were examined under a powerful lens. I found the usual plane of soft tissues extending from the entire anterior margin of the ethmoid to the posterior margin of the cartilaginous nasal septum. Now when a bird possesses a single vomer, it is in this median plane of tissue that it is found, and for the common fowl, Professor W. K. Parker says, in his invaluable little treatise on the Morphology of the Skull, that, "The maxillopalatine plates (*mx. p.*) are broader and reach nearly to the mid line, being separated partly by the nasal septum and partly by the small vomer, which is rounded in front, and split for a short distance behind. The forks of the vomer (*v.*) articulate with the inner and anterior points of the inner plates of the palatine bones, which lie side by side mesially, nearly concealing the rostrum," (pp. 246, 247). Only in one turkey,

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*In forwarding my proof for correction, Dr. Conklin, the *Journal's* Editor, did me the very great favor in sending with it the MSS. copy he had made of Prof. Owen's article, here alluded to, for which I am exceedingly grateful. Upon reading this over I find nothing in it respecting the *vomer*, or these *vomerine ossifications*, dealing as it does principally with the distribution of the olfactory nerves in the Vulture and Turkey, with the view of throwing light upon the question of the power of smell in the former bird. R. W. S.

and that an old domesticated gobbler, did I find any semblance of such a medium vomer, and in that specimen it was exceedingly small, close to the ethmoid, and composed of bone of the most elementary character. The aperture which fulfills the office of the "posterior nares" in a bird occurs in this locality, and the free edges of it extend from the anterior inner points of the palatines, to the corresponding apex of the maxillo-palatine, on either side. In the vast majority of the turkey heads which I examined, a delicate rod of bone is found in the soft tissues composing these free edges. So it will be seen that these two little rods of bone (Fig. C. *vx.*) extend from the anterior inner points of the palatines to the posterior apices of the maxillo-palatines, one of them on either side. Now it is with these "anterior inner points of the palatines," that the *vomer* in a common fowl articulates, the bonelet extending forward, as already stated, as a diminutive median spine. This calls up some interesting questions, for say the little *semi-ossified* piece in the median plane of tissue—which I discovered only in one very old turkey, and in it, it did not fork behind and have the posterior extremities of the forks "articulate with the anterior inner points of the palatines,"—does not represent the vomer, but that these little fully ossified rods, that I have just described, do; then we certainly have a singular departure in the turkey for a gallinaceous type, from the usual order of things.

In a head of a wild turkey now before me, an old adult male, I found no median ossification at all, to represent a vomer, but on the contrary both of these little rods are present and thoroughly ossified. As I write about this condition in the turkeys, my mind naturally reverts to what has been held for the *Pici*, and the organization in them of the corresponding parts; it has been said, as we know, that they have double vomers in adult life—but this was disputed by Garrod, ("*Ibis*" 1872 pp. 357-360), who claimed to have found a median vomer for the woodpecker.

A careful comparison of the *mandibles* of these two series of turkey skulls, fails to reveal to me any contestants of characters that could be relied upon to distinguish those belonging to the wild ones from those of the domesticated variety.

I have also compared the *hyoid arches:* the *sclerotal plates* of the eyeballs; and other minor ossifications about the skull, and what I have just said in regard to the mandibles, applies with equal force to them, there are no reliable characters to distinguish them.

This brings my comparisons of these two series of skulls to a close, and I will here complete my paper by a brief recapitulation of the constant characters which, so far as I have been able to ascertain, seem to distinguish the skull of a wild turkey from that of a domesticated one, the latter being descended from domesticated stock of long standing, and as free as possible from any mixture with the wild types.

In drawing up this summary, I would have it distinctly understood that only the most constant differences have been selected, and exceptions even to these may occasionally be found among tame turkeys, where for some unknown cause, they seem, in certain individual cases, to revert again to the cranial structure of the wild species.

These selected characters, will, however, show the tendency of the changes that are taking place, and are apparently up to the present time, typified in the skull of the tame turkey which I have chosen in the figures to illustrate them. I take it that these changes are still in somewhat of a transitional stage, and that eventually tame turkeys will differ quite widely from the wild ones. And that this difference will become much greater and more rapidly brought about when the breeding and selection of turkeys is more carefully looked into, with the view of introducing certain improvements in them.

ANALYTICAL SUMMARY.

1. As a rule, in adult specimens of *M. g. mexicana,* the posterior margins of the nasal bones indistinguishably fuse with the frontals; whereas, as a rule, in domesticated

turkeys their sutural traces persist with great distinctness throughout life.

2. As a rule, in wild turkeys we find the cranio-frontal region more concaved, and wider across than it is in the tame varieties.

3. The parietal prominences are apt to be more evident in *M. g. mexicana* than they are in the vast majority of domesticated turkeys; and the median, longitudinal line measured from these to the nearest point of the occipital ridge is longer in the tame varieties than it is in the wild birds. Generally speaking, this latter character is very striking and rarely departed from.

4. The figure formed by the line which bounds the occipital area, is, as a rule, roughly semi-circular in a domesticated turkey, whereas in *M. g. mexicana* it is nearly always of a cordate outline, with the apex upwards. In the case of the tame turkeys I have found it to average one exception to this in every twelve birds; in the exception, the bounding line of the area made a cordate figure as in wild turkeys.

5. Among the domesticated turkeys, the interorbital septum almost invariably is pierced by a large irregular vacuity; as a rule, this osseous plate is entire in wild ones.

6. The descending process of a lacrymal bone is more apt to be longer in a wild turkey than in a tame one; and for the average the greater length is always in favor of the former species.

7. In *M. g. mexicana*, the arch of the superior margin of the orbit is more decided than it is in the tame turkey, where the arc formed by this line is shallowed, and not so elevated.

8. We find, as a rule, that the pterygoid bones are rather longer and more slender in wild turkeys than they are among the tame ones.

9. At the occipital region of the skull, the osseous structures are denser and thicker in the tame varieties of turkeys; and, as a whole, the skull is smoother, with its salient apophysis less pronounced in them than they are in the wild types. There is a certain delicacy and lightness,

very difficult to describe, that stamps the skull of a wild turkey, and at once distinguishes it from any typical skull of a tame one.

10. I have predicted that the average size of the brain cavity will be found to be smaller and of a less capacity in a tame turkey than it is in the wild one. In the case of this class of the domesticated animals, this would seem to be no more than natural, for the domestication of the turkey has not been of such a nature as to develop its brain mass through the influences of a species of education; its long contact with man has taught it nothing—quite the contrary, for the bird has been almost entirely relieved from the responsibility of using its wits to obtain its food, or to guard against danger to itself. These factors are still in operation in the case of the wild types, and the advance of civilization has tended to sharpen them.

From this point of view then, I would say, that mentally the average wild turkey is stronger than the average domesticated one, and I believe it will be found that in all these long years, the above influences have affected the size of the brain-mass for the latter species in the way above indicated, and perhaps it may be possible some day to appreciate this difference. Perhaps, too, there may have been also a slight tendency on the part of the brain of the wild turkey to increase in size, owing to the demands made upon its functions due to the influences of man's nearer approach, and the necessity of greater mental activity in consequence.

ART. XXI. "SURRA," OR PROGRESSIVE PERNICIOUS ANÆMIA.

BY RICHARD W. BURKE, A. V. D.,

Jubbulpore, India.

Among the most important diseases in medicine are the so-called constitutional blood-disorders: Anæmia, Chlorosis, Leukæmia, and Pseudo-leukæmia—which are so little understood, also Pernicious-Anæmia, the etiology of which is still obscure. Since its discovery by Addison in 1835, and the early observations of Biermers in 1868—1872, a great deal of information regarding its general features has been made out, but chiefly through the observations of Quinke, Eichhorst, Zenker, Immerman, Ponfick and others. We may explain, very briefly, our present knowledge with respect to its etiology, symptomatology and *post mortem* appearances considered generally and specially. We recognize, in the horse as well as in the human subject, two forms of pernicious anæmia; idiopathic or essential, and symtomatic.

The causes of the first form, which is the essential disease, are altogether unknown. In general, bad feeding and stabling, and non-hygienic conditions, are the usually received causes; and, owing to this, we consider it an 'infectious disease'; or, it may be regarded as a constitutional disease of the blood, and of the red bone-marrow. All the cases which have come under observation have hitherto proved incurable.

The causes of the second form are better known. This form is caused by a certain blood-sucking intestinal worm, principally the *Ankylostomum* (*Dochmius*) *duodenale* and *Botriocephalus latus.* This was first pointed out by Perroncito, in 1880, to be the cause of progressive pernicious anæmia among workmen and others. The disease was described for the first time in India, under the name of

"Surra" as occurring commonly in horses, mules and camels, by Inspecting Veterinary Surgeon G. Evans, M. D., of the Army Veterinary department, who noted the presence of a parasite in all the diseased animals examined, and in others subjected to experimental inoculations. The nature of the parasite, and its exact pathological significance are points which Dr. Evans did not satisfactorily clear up ; although, the suggestion subsequently made by Veterinary Surgeon Steel, that it was a spirillum, would not be accepted by him, who maintained that whatever it might be, it was not a member of the family of bacteria. Dr. Edgar M. Crookshank, who carefully studied the parasite in 'surra' blood, agrees with Dr. Evans in considering it to be *not* a sprillum, and proposes to name it after its discoverer, *Trichomonas evansi*. But the relation of this parasite to the disease has remained an unsettled question.

The remarkable tendency of the blood to harbor parasites has been a matter of not recent observation. Their characteristic features manifest a disposition to augment in numbers under any shock or depression of the system. Sometimes, prolonged exposure to malarious and ill-sanitary influence, debilitating effects from impaired nutrition, from hyper-pyrexia, etc., issues in a morbid alteration of the blood peculiarly fitted for the growth and multiplication of these organisms ; but, even when no change in the surroundings of the animal is discoverable, a deep impression is often stamped upon the system, leading to their increase. In a recent inquiry it has been shown that these organisms are to be found in no less than 25 per cent. of apparently healthy animals.

These parasites are usually classed as filaria, and they do not seem to excite any disease when in moderate numbers. In other cases, apoplexy may result from embolism of the heart and closure of the valves ; and also the embryos appear to cause apoplexy by blocking up the capillaries of the brain. Besides this they may cause epileptiform convulsions and anæmia and wasting.

In all kinds of animals, then, this parasite must exist, ready to resume its active form whenever the conditions of climate, of weakness and ill-health presents themselves afresh. Without doubt, the parasites which are the cause of this disease are widely prevalent, and exist in the blood of most animals, but attenuated ; and in this state an animal may harbor them in its blood, without showing much, if any illness. They only become dangerous when, through overcrowding, and other causes, in bodies enfeebled by disease their virulence becomes exaggerated. Under weakened states of the body, as in 'surra,' doubtless the parasites multiply rapidly, and even assume pathogenic properties, under favorable conditions. It should also be stated that the parasite in 'surra' has never been isolated apart from the blood, and the disease then produced by inoculating healthy animals with it. It is most probable therefore that the parasites in 'surra' are only associated with the disease, the impoverished blood affording a suitable nidus for their development.

Pathology.—Zschokke first decribed this disease under the name of pernicious anæmia of the horse, and also noted the presence of spiral organisms in the blood, the same as those observed by Klebs and Frankenhauser in the human subject. The presence of these organisms, he considers, accounts for the infectiousness of the disease. Fröhner also saw organisms in the blood of the horse between the red corpuscles: they were from ⅛ to ½ the size of a red blood corpuscle, were not quite so thick, but usually grouped together in fours and sixes.

M. Netter shows that these micro-organisms found in the alimentary canal in its normal state are also found in the bile duct; they penetrate the small ducts of the liver, and pass from thence into the blood (*Archives de Medecine*, 1884). Veterinary Surgeons of the Army, on the continent of Europe, have generally described it under the head of lung disorders of an infectious type. Until my own observations were published (*Supplement to Report on Remittent Anthrax, 5th March*, 1887), veterinarians in India have treated it under different names, as 'surra,' relapsing fever, etc., according as it suited the fancy of different writers.

Other animals, besides the horse, have been known to suffer from the disease. Megnin describes a symptomatic type of this disease seen in dogs and cats, which was caused by an ankylostome producing anæmia, and which is, without doubt, a similar disease to the symptomatic form of anæmia in man. Johne saw this disease in the dog as a secondary affection following a supperative form of disease. Imminger has observed enzootic outbreaks of it in cattle. Fröhner describes having only recently seen cases of this disease in the horse, and Friedburger also saw an outbreak of it in the same animal. The cases described by Dieckerhoff, under the name of "scalma," are undoubtedly the same disease. The latter author mentions nine cases which, although of a milder nature, showed symptoms allied to those of pernicious anæmia. Dieckerhoff considered it infectious.

Etiology.—Dr. Ponfick's experiments show that pernicious anæmia may be experimentally produced in dogs and rabbits by administering blood-dissolving agents to them for some weeks, but especially glycerine, pyrogallic acid, etc., which always produced a state of lethargy and extreme weakness in these animals, the mucus membranes becoming pale and anæmic, the action of the heart very irregular, with blowing sounds heard on auscultation of the latter organ, the pulse also weak, and the temperature raised. The excrements were sometimes mixed with blood. A microscopic examination of the blood showed a nearly normal condition of things, in the first week; from the third to the fourth week, the blood became pale and watery, with an excess of white cells in it. On dissection of the body, marked anæmia was found, with fatty degeneration of the muscles of the heart, of the intima of the veins, the liver, and kidneys; and blood-vascular extravasations in internal organs, but principally in serous membranes, in the lungs, the brain, the spinal marrow, subcutis, etc.

Professor Ponfick thinks that the blood-dissolving agents cause separation of the hœmoglobin from the red blood-corpuscles, leading to marked disturbances in the relative proportion of the blood constituents. The leucocytosis, which is a marked feature of pernicious anæmia, is also characteristic of hæmoglobinuria, and which in acute and subacute cases is always present. An excess of free hœmoglobin in the spleen, liver, and kidneys may probably be a cause of swelling of these organs seen in this disease. The continued loss of hæmoglobin from the blood interferes with the formation of new blood in a very serious manner. The author has proved by further examinations that free hæmoglobin in the blood destroys the white cells and promotes the growth of fibrin ferments. Large quantities of these ferments cause a marked disturbance of the circulation, the blood flows slower than under normal conditions, which necessarily interferes with the proper function of the blood-forming organs. The body becomes poorer and poorer through the large numbers of the red blood-corpuscles becoming destroyed in this disease, and through loss of hæmoglobin and oxygen ; which cause defective nutrition leading to excessive deposition of fat in the principal organs of the body, and which is the cause again of hæmorrhages in different organs.

One cannot refrain from pointing out the very meagre evidence we possess, in the face of these experiments, with regard to the share taken by the parasites met with in the blood of surra. The results of these experiments at once suggest to our mind an explanation with regard to the parasites as a consequence of impoverished blood in this disease.

Dr. Crookshank states that the closest examination has confirmed this belief "that the parasites found in the blood of healthy rats are morphologically identical with the stained parasites of surra." Dr. Evans noted the presence of filaria of different species in the blood of diseased as well as healthy camels (*Veterinary Journal, July,* 1881), and Crookshank notes the same fact in the case of filaria found in the blood of rats. Since all observations prove the existence of filaria of different species in the blood to be compatible with health, we have no reason for wonder when we find them greatly increased during disease.

It should be further stated, as Dr. Crookshank points out, that the organism has never been isolated apart from the blood in surra, and the disease then produced by inoculation of healthy animals,—a point of considerable moment in the etiology of this disease.

Symptoms.—The appearance during life are principally those of a general loss of blood, indicated by anæmia of mucous membranes, languor, dyspnœa, a weak and readily excitable pulse, palpitatation of the heart, and fever. There is increasing debility, with little or no loss of appetite. In spite of a greedy appetite, debility appears progressive in character. Dropsical swellings usually occur towards the latter stage of the disease. The malady is usually progressive, seldom acute in character. The course is prolonged to several, usually six to eight weeks.

With regard to the fever accompanying this disease, Mr. Steel has noted an unlimited number of remissions on the 4th and 5th days usually, which he mistook for the remissions seen in relapsing fever. Zschokke has shown that the fever accompanying these cases is of an intermittent (*quartan*) type. Fröhner has likewise noted a marked rise in temperature on the 4th day, which, with slight remissions, remained high till death. He also saw partial paralysis, or an increasing weakness of the hind quarters in horses the subject of this disease, a symptom which was often observed in the Burmah outbreak. Zschokke mentions jaundice as another frequent symptom in the horse, as well as enlargement of the lymphatic glands and punctiform extravasations—symptoms commonly noted in surra in India. The urine is albuminous in character, and of an acid re-action.

Post Mortem Appearances.—On dissection, a general anæmia, together with fatty metamorphosis, unattended by other changes, is noted. Frequently, though not always, hæmorrhages take place more or less in all the organs, but principally in the serous membranes, the muscles, the retina, and the larger glands. The spleen and liver are sometimes swollen, and contain thrombi in the larger vessels. The marrow in the bones appears altered in character, and presents a jelly like aspect, containing innumerable granular blood-corpuscles. The liver and other organs contain an excess of iron-salt. The true pathological cause is to be found in the blood; the red blood-corpuscles are decreased in number and altered in shape, size and aspect frequently presenting a markedly serrated outline. Nodular blood particles are also to be seen in the blood. In short, the blood is in a state of complete disorganization.

Zschokke states that none of the principal organs show any marked structural change. Besides anæmia, he has noted hæmorrhages under the serous membranes, swelling of the liver and spleen, loss of striæ in the muscular fibres of the heart, blood extravasations in the marrow of the bones, and a decrease in the number of red corpuscles in the blood, the same as in pernicious anæmia in man. He also noted the presence of spiral organisms in the blood.

Mr. Oliphant, Principal Veterinary Surgeon in India, in his G. O., dated 12th Febuary, 1887, writes :—"In one outbreak of "surra" in the 18th Bengal Cavalry, in which 180 horses died, I made dozens of *post mortem* examinations, and the appearances in all were identical—extreme pallidity of all the tissues, with perhaps a trifling serious effusion into the abdomen, etc. In fact, the animals looked as if they had been starved to death." Dr. Evans was also most careful in pointing out that absence of any marked structural changes was peculiar to surra. The other symptoms, such as the adipose degeneration of the liver, spleen, heart and other organs, the general hæmorrhagic diathesis, etc., may be regarded as secondary in origin.

Diagnosis.—The marked anæmic conditions observed, both *ante* and *post mortem*, the leucocytosis, fatty degeneration of the muscles, liver, spleen, kidneys and other organs, the general hæmorrhages, and the chronic state of fever,—which end in death in so many cases, leave no doubt as to the nature of the disease.

Treatment.—In all forms of serous anæmia, authors have always attached the greatest importance to treatment by arsenic; and in a recent paper by Professor Osler, in the *Therapeutic Gazette*, he states that in all cases of pernicious or essential anæmia there was no one case of recovery in which arsenic did not form the basis of treatment. It is not, however, a specific. Iron is only occasionally useful in these cases. Mr. Steele also mentions these remedies in the treatment of "surra" although he met with no greater success than usually follows their use in pernicious anæmia in man. Exercise would appear to be more favorable to the recovery in these cases than absolute rest. Change of climate has been found occasionally useful, both in the case of man and in that of the lower animals. Sir Joseph Fayer—who even suggests that "beri-beri" in man is probably one form of pernicious anæmia—thinks that a hilly climate is particularly suitable for the less advanced cases, although he admits its efficacy in more prolonged cases to be somewhat doubtful, if not altogether *nil.*

The whole subject of parasites and parasitism in equine medicine, is one which has yet to be studied completely; but, as a clinical observer, I believe that I can recognize in "surra" a pathological state which has a curious relation to pernicious anæmia in man, which I have endeavoured to bring out in this paper for the benefit of English-speaking veterinarians in India in particular, and to associate it with that disease of the lower animals long since recognized by veterinarians on the continent of Europe, but especially by Megnin, Johne, Imminger, Zschokke, Friedberger, Fröhner and others.

ART. XXII.—ANEURISM OF THE MESENTERIC ARTERY.

BY RICHARD W. BURKE, V.S., A.V.D.

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History.—Rigot in 1829, and Hering in 1830, were the first to observe that colic in the horse was in many cases due to worm-aneurism; and Schutt a few years later corroborated their observations. Bruckmüller carefully examined this subject in a number of horses, and found that very few of them are ever free from it. He confirmed the observations made by other veterinarians, that a great relationship between aneurism of the mesenteric artery, and colic cannot be denied. M. Bouley (*Dictionnaire Pratique*, 1856, *p.* 548), showed that hæmorrhagic and intermittent colic are dependent on aneurism of the mesenteric artery. Hahn, in 1862, considered periodic colic was due to aneurism of the mesenteric artery. Cornevin, in 1869, described a very interesting case of thrombatic colic with stoppage of the iliac and cæcal arteries. Since these observations, the condition has become familiar to all practitioners.

In oft-recurring cases of colic in the horse, aneurism of the mesenteric artery should be suspected. It frequently also escapes detection until post mortem, as in many horses aneurism of the mesenteric artery is seldom absent, even though there were no symptoms of its presence during life; this particularly so in the ass. General experience has now established this fact beyond a doubt. The works of Bruckmüller, Röll, Friedberger, Fröhner, Bollinger and others, show that in Germany 90 to 94 per cent. of the horses have aneurism of the mesenteric artery. Ellenberger noted that in eighty-five dissections he made, there was only one that was free from aneurism of the mesenteric artery. This aneurism is seen in young foals at birth, as well as in old horses, and especially in the anterior mesenteric artery.

Causation.—The presence of the worms, — variety *Strongylus armatus* of Rudulphi—is the cause of the chronic changes in the walls of the mesenteric artery, through which a thrombus results. Through lesions in the intima, a chronic traumatic endo-arteritis is set up, producing aneurism.

Patho-Anatomy.—The walls of the aneurism are thickened, (especially the media with the enveloping mesentery) long-oval and flattish, or spindle-shaped; less frequently it is sacculated, and of the size of a man's head. The intima shows the greatest variety of inflammation and degenerative changes, such as swellings, fatty and calcareous degenerations, becoming into knots and even sloughs resulting, with subsequent fibroid contraction. The contents are made up of a laminated thrombus with canals or perforations through the latter. The lumen of the aneurism is obstructed, and the thrombus may travel into the branching arteries, and sometimes even into the aorta. The clot is usually hard, knotty and brittle, with purulent softening in its interior. Besides the presence of the thrombus, a worm larva of the strongylus armatus will be found, generally nine in each aneurism (Bollinger, *Wochenschrift fur Thierheilkunde und Viehzucht,* 1873, *p.* 22), which cause the chronic changes of the intima, through which a thrombus results. On account of the stoppage of blood-flow for the nutrition of the intestinal walls, a threefold danger is in operation to produce colic: first, the lumen of the thrombus becoming completely blocked up may lead to stoppage of blood-flow to all the arteries beyond it; or, secondly, the thrombus may migrate to one of the branch arteries; or, lastly, detachments of the thrombus may be carried along as emboli, with the blood, to the other branches of the intestinal arteries. In all these cases the thrombus fixes itself and prevents circulation in all collateral branches; then in the blocked up capillaries anæmia results; and from the rebound of the blood current from the point of obstruction serous and bloody transudation into the intestinal walls, and even into the lumen of the intestines, results (the so-called "sero-hæmorrhagic infarct"), which leads to paralysis of the intestine. Hence stagnation in the intestinal canal results, which, undergoing decomposition, creates gas formation and colic. The paralysis leads to inflammation and rupture of the intestine in many cases, and death.

Professor Lustig (*Deut. Zeitschrift fur Thiermed u. vergl. Pathologie, Bd. i, Heft ii and iii,* 1879), of the Hanover Verterinary School, describes an interesting case of embolic nephritis with worm-aneurism in a horse, which on post mortem examination showed thrombi containing strongyli in the renal artery, and worm-aneurism of the anterior mesenteric artery, the colic artery, the ilio-cœcal artery, with thrombus in the pulmonary artery and hypertrophy of the heart.

ART. XXIII.—TECHNICS OF ANIMAL VACCINATION.*

BY W. L. ZUILL, M. D., D. V. S.

Professor of Obstetrics, Surgery and Clinical Surgery, Veterinary Department, University of Pennsylvania.

Since the discovery of vaccine virus, and proof that it gave immunity to Small Pox, one great question has vexed the world of medical science. It has asked how can we obtain an absolutely pure virus, the use of which will not be attended with the danger of inoculating the patient with some specific disease. This danger, while very great, in the use of humanized lymph, is very much diminished when bovine lymph is substituted.

This question of obtaining pure bovine lymph has reached its highest development in the countries of Continental Europe where the production of this material is under the supervision of the different governments, who have placed it in the hands of qualified veterinarians, thus obtaining the best guarantee possible for its purity. Does the same qualification hold good in this country? I am sorry to say that it does not. How many of the hundred so-called Vaccine farms are under the guidance of men who are qualified by reason of their training and education to distinguish the difference between bovine tuberculous and contagious pleuro-pneumonia, or to recognize this latter disease from that of a sporadic character.

I assert that any who are willing to take the trouble will find that a very small proportion of these farms are under scientific guidance of any kind, even the most questionable.

Vaccine, whether it be obtained from the equine or bovine race of animals, possess the same characteristics and if inoculated into the human system confers immunity from small pox, or a second vaccine inoculation. It has been considered that the characteristic properties of Vaccine was inherent in the liquid. This is a mistake. It has been demonstrated beyond the possibility of a doubt that the active principle of vaccine is due to the presence of small special bodies which by every one is now admitted to be infectious parasitic vegetable organism. These microbes considered as the specific agents of small pox and vaccine are small perfectly spherical micrococci. Chauveax has undeniably demonstrated that vaccine lymph deprived of these corpuscular elements loses all its physical characteristics. While the microbe of vaccine does not differ in its visible characters from the small pox microbe, I do not desire to be understood as saying that vaccine is small pox attenuated by its passage through the body of the horse or cow. Kelb mentions as a characteristic which is more or less common to the microbe of vaccine as to those of small pox the disposition to form groups of four, and has therefore given them the name micrococcus quadrigeminus.

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*Read before the Pennsylvania State Sanitary Convention at Philadelphia, May 15, 1886.

For nearly one hundred years the desire to determine the question whether the vaccine which we employ to protect ourselves from small pox came in the first place from the horse or cow, has given rise to the most animated discussion in the medical world. Jenner in his own work published in London in 1798 entitled, "An inquiry into the cause and effects of Variola Vaccina", admits that vaccine was originally derived from the horse, recognizing that certain persons employed to care for milch cattle were not susceptible to the small pox virus with which he inoculated them, and that they owed this immunity to a disease which they had contracted from the udders of the animals which they were in the habit of milking, but at this point he has been obliged to admit that these cattle had taken the disease from horses with which they were directly or indirectly in contact. This disease of the horse is spoken of by English writers of veterinary literature as grease; this misapplied cognomen is likely to lead one astray and to divert our attention from the true constitutional disease, termed by M. Bouley Horse pox, to that purely local one called as I have said by English writers—grease. Cow pox, may be produced in the cow by inoculating with horse pox, with natural or artificial cow pox or by human vaccine ; upon this property depends the practice known as *animal vaccination*.

The vesicle of vaccination in the horse presents different characters from those which are found in the cow or in man. In the horse they present a conical appearance, instead of being umbilicated, as is found in the others. The secretion of the vesicle is also different in the horse ; that from the entire vesicle is effective ; while in the cow and man that from the centre of the vesicle only presents any activity. What is this special contagion ? Is this contagion the same for man as for the horse or cow, or are there different contagions for each ? The solution of these questions depend upon the similarity of the germ of small pox and of vaccina. They have for more than half a century been the subject of the most interesting discussions, and to-day they may be said to be altogether unchanged and undecided. It remains for modern scientists to eclucidate the facts from these questions.

The technics of animal vaccination. Up to the present time vaccination termed animal has been resorted to only in the bovine species. I prefer to use for this purpose small animals varying from six to eighteen months of age ; although an advanced age is no more serious objection than what would naturally follow from an increase in size. These calves should weigh from two to five hundred pounds and be in good health. It is seldom I can obtain animals that are fit for immediate vaccination ; as a rule they come to us in a very unthrifty condition. They have been wintered in the barn-yard, often without even a shed for shelter, their food which at the best has been corn stalks, has left them in such condition that unless much care is exercised in the first ten or fourteen days the change of food will be sufficient to bring on an attack of diarrhœa. Notwithstanding the great care exercised in the change of food of these animals, it is by no means uncommon to see them suffer from slight attacks of this disease. The first thing necessary after the animal has reached our hands is to rid its hide of the lice and other vermin which infest it, this is absolutely essential for obvious reasons ; while the animal is running in the field or yard it appears to suffer little or no inconvenience from these insects which are benumbed with cold, but immediately they are put into a warm stable they will begin to itch and consequently rub, bite and scratch themselves, their temperature will go up to 103° or more, the hair will begin to fall, and in a short time they are sorry looking objects. In order to rid the animals of the vermin it is only necessary to give them two or three baths of sheep dip ; this, with a week or ten day's careful feeding, is all that is required to bring the animals into condition to be vaccinated. Color is a question of importance in the selection of animals; a red and white coat indicate a soft skin, one that is free from black pigmentation is an advantage in our observation of the different stages of the eruptive fever. When the animal is in proper condition, it is brought into the operating room where it undergoes a most rigid examination. There must not be any diarrhœa or digestive derangement of any kind, neither must there be any bruise, wound or abrasion, broken horns or hoofs of recent date, as complications of this kind will prevent the take of the vaccination. Animals upon which are found neoplasms of any kind are also rejected. Elevation of temperature, increased respiration and pulse with other symptoms of acute disease are carefully looked for and as carefully rejected when found. An exhaustive and thorough examination is made to determine the presence of lung lesions, and the slightest indication of their presence is sufficient to prohibit the utilization of that animal for the propagation of vaccine lymph. The animals which are to be used for vaccinating should be confined in large roomy stables. Large windows should furnish light to this building, ventilation and drainage to be as perfect as it can be made. The food should consist of bran, ground corn, oats and cut hay supplied in liberal quantities. Straw for bedding must be used freely. A bed twelve to fourteen inches thick to be kept under the animals constantly ; they should be carefully groomed twice every day, and as much pains taken with their coats as if they were race horses.

When it is desired to vaccinate an animal it is led to the operating-room, and there placed upon an upholstered table, upon its back, its legs upward, each of which after being protected by a pad of thick felt is securely fastened to a post in the frame of the table ; while in this position the hair is removed from the inside of the thighs and the belly, as far forward as the umbilicus. The hair is first removed with the scissors and soaped and shaved perfectly clean ; upon the shaved surface are afterwards placed from fifty to seventy or even one hundred points of insertion, varying in size from a quarter to a half dollar. These points are made by first scraping off the epidermis and afterwards making a number of scarifications in different directions.

Then comes the important step of the operation, placing on the vaccine ;—This should be done with the greatest care as upon this depends success; it is truly remarkable what an astonishing number of failures can be obtained with the best virus, when the operation is not properly performed. The animals, after being vaccinated are placed in a warm stable, and where there will be no danger of drafts or cold to which they are now very susceptible. The stalls in which they are placed must be wide enough to be comfortable, but sufficiently narrow to prevent the animal from turning, which it will invariably try to do in order to lick the scarifications which burn and sting very much. Abundance of clean straw must be supplied and the fæces from the animals removed as fast as they fall. This insures cleanliness which is one the great essentials of success.

We must not forget that the full product of vaccination should be obtained on the sixth day at the farthest, and in Europe when all the animals are slaughtered for food they are always sent to the butcher on the seventh day, or before the posible development of suppurative fever.

It is a fact that the animals do not suffer through vaccination, how numerous so ever the insertions may be; it may suffer from the effects of a journey, or from ill treatment it has received, from change of stable, or companions but from vaccination never, nor is vaccination ever a cause for depreciation in its value.

It is an unanswered question why at or during the vaccinal period calves are likely to be attacked with diarrhœa and tympanitis? Diarrhœa will often yield to light and proper diet and some emolient drinks in a few hours; if it persists, it may arrest or at least delay vesication. Tympanitis, which is a frequent complication is a disagreeable one; if this complication should arise at the beginning of the eruption, it modifies it at once. The vesicles become flattened and may even disappear or dry up completely. Should the vesicles be full when the stomach trouble comes on, the flow of lymph will decrease and in a few moments entirely disappear. All that can now be done is to treat the tympanitis and wait results. A few hours often is all that is necessary for the skin to regain its softness and for the vesicles to return to their normal condition.

Notwithstanding the great care exercised to prevent the vesicles on the belly of a heifer from being torn or broken they will be more or less injured; this is an accident difficult to avoid, and one of little importance.

If the surface of the vesicles are torn they need not on this account lose either their contents or their intrinsic value; for this reason there is no necessity to try to avoid this accident of tearing, as could be done by placing a pad over the abdomen of the animal and by changing the ordinary litter, for a floor with an opening, which would allow the escape of excrementitious matter. The greatest danger to the vesicles, and one which must be carefully guarded against, is the animals licking the wounds and thus wash away the vaccine just deposited there; this itching sensation which causes the animals to lick themselves is evident immediately after the vaccination and during the irruptive stage.

We can avoid this means of sterilization and bruising by placing the animal in a stable in which it cannot turn, or by putting on a muzzle; for the same reason it is always advisable to secure the tail of the animal, which can be easily done by placing a splint upon it; thus preventing it from being bent. This simple procedure to a great extent lessens the ease with which the animal approaches its mouth to the vaccinated region.

The collection of the vaccine lymph is a procedure which requires a great deal of care and judgment or in all probability you will collect nothing but inactive serum.

Vaccine lymph is nothing but serum holding in suspension small spherical bodies micrococci, which constitutes the active principle of the lymph. The presence of these bodies gives to the lymph a thick mucilaginous character; this gummy feel is altogether wanting in serum which has not the active principle of vaccine. The lymph may be collected from the vesicles under pressure of forceps made for this purpose and is not by any means an objectionable feature. After the scab and other foreign matter has been removed from the vesicle they should be gently pressed with a clean linen rag slightly damp, and should blood flow, it must be removed in this way until it has entirely stopped. In a few moments serum or lymph will start which may be recognized by the following test: take a small quantity between the fingers and thumb, if it is sticky as a solution of gum, it is *prima facia* evidence that the lymph is good, but if this sensation or condition is not to be had, then the vesicle must be abandoned. If it is desired to collect the vaccine lymph in tubes, it is allowed to form on the surface of the vesicle in little pools, and in the pools thus formed we may place a vacuum tube or a capillary tube open at both ends which are soon full; such tubes, however, are of little value as they become useless in a few hours. When mixed with equal parts of distilled water and glycerine it may keep five or six days.

Ivory Points.—This is certainly the best method of preserving animal vaccine in a dry state; these points when properly prepared will retain their activity for three or four weeks. In every instance the points should be double charged; the second charge must not be made from the animal which supplied the first; this gives greater security, for should the first charge have been made from a negative animal or from a negative vesicle only by the slightest chance would the second charge be of the same character. Points destined for a long voyage are tripled charged, and afterwards dipped in a solution of gum arabic and the whole covered with tin foil.

Vaccine in pulp. — The vesicle alone. This barbarous practice was used in the earlier days of animal vaccination, it consisted in excising the vesicle with a portion of the skin down to the subcutaneous connective tissue. As far as the results of this method are concerned, I have nothing to say ;—as, with an execution it is merely the brutality of the practice—the wound made on the abdomen of the animal from which blood flowed in streams, and the uncanny appearance of the piece of skin, scarcely an attractive object to place before the person to be vaccinated, but in order that the results of this practice be satisfactory, it must be used at once.

Glycerinized Pulp.—This method consists of using the whole vesicle; it was first introduced in Milan when they excised the skin with the vesicles which they fix to a board with strong pins. The vesicles are scraped and with this scraped skin they make a glycerinized pulp or paste; this is placed in a bottle and a little pure glycerine placed on it which acts as a cork or stopper to exclude the air. This pulp was improved on by Warlomont by removing from the surface every impurity, even the so-called vaccine scab. After this is done he says that by a special process the core of the vesicle is reduced to a thin mass, this is treated with glycerinized water and the emulsion obtained is put in cylindrical tubes of amber colored glass. This emulsion keeps so well that he advises vaccinators to constantly carry one of these phials in their cases for use at times of need.

Doubtless this emulsified animal tissue—and this is what it must be if it is the scraped vesicle—may be good enough for European practitioners, but I would not ask an American practitioner to use any such compound. I believe that I have made a glycerinized vaccine which is very much better than Warlomont's, even as much superior as his is an advance on the old method of using the entire vesicle. The process is remarkably simple.

The first step is to thoroughly cleanse the vesicle of every particle of foreign matter and as the pure clean lymph wells up from the depths of the vesicle to collect it in a small spoon —it is possible not to collect shreds of tissue and foreign matter at the same time—the lymph as collected is placed in a small phial and an equal weight of chemically pure glycerine is incorporated with it, this is afterwards filtered not only making a beautifully clear liquid but also removing all foreign matter.

This solution of glycerine of lymph, will keep, and be absolutely sure in its results for a number of months.

ART. XXIV.—SOME FAMILIAR PRACTICAL METHODS IN BACTERIOLOGY.

BY E. O. SHAKESPEARE, A. M., M. D.

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The practical importance of bacteriological research, in its bearing upon the etiology and diagnosis of infectious diseases, is at length beginning to be properly appreciated in this country, where, perhaps more than in any other, scientific questions are viewed from the stand-point of utility.

As such researches necessarily consume much time, even under the most favorable circumstances, a few words concerning some of the practical methods which actual experience has proved to be satisfactory may be the means of saving some trouble and time to those whose occupations leave them little of the latter to lose.

1st. As to methods of staining. It is now unquestioned that the satisfactory staining of bacteria is a *sine qua non* in their preparation for study under the microscope. The few remarks which will be made under this head will be limited to a brief explanation of the mode of preparation and use of some of the most generally applicable coloring fluids.

a. Method of staining tubercle bacilli.—I have found that the Koch-Erlich-Rindfleisch rapid method has constantly given satisfactory results, both as to reliability and rapidity. With it, the examination of sputum or other fluid or semi-fluid material for the presence of the tubercle bacilli, requires no more time and trouble than the examination of urine for tube casts, indeed, not nearly so much of either, as the time required for the settlement of the solid particles suspended in the urine is often considerable.

As soon as the fresh material suspected of containing tubercle bacilli is obtained, it may be at once spread upon a cover-glass as the first step in the process of examination. A word just here as to the collection of this fresh material. Of course, the vessel in which it is collected and kept, should be chemically clean, that is, sterilized, preferably by means of high dry heat, say 150° C., for an hour. In the case of sputum, it is best that the expectoration be ejected first into a broad shallow vessel, such as a saucer. Then the more solid and consistent portion of the sputum, freed as much as possible from mucus and saliva, should be transferred to the vessel in which it is to be transported to the place of examination. The material should be prepared for examination as fresh as possible, for it should be well understood, that not only do the common bacteria grow and multiply very rapidly in ordinary sputum, which is kept, but even the usually slowly developing tubercle bacilli increase in numbers.

In the case of sputum, a thin film of the thick, opaque portion is spread upon a cover glass. In the case of a supposed tubercle, removed from the tissue, the lungs for instance, it is to be crushed, moistened with a drop of sterilized distilled water, and the grumous fluid spread on the cover glass in as thin a film as possible. Suspected pus. urine, or any other fluid or semi-fluid matter, is to be spread upon the cover glass in a similar manner. The film thus prepared, is now allowed to dry *spontaneously* in the air of the room, *without extra heat*. As soon as it is thoroughly dry, the cover glass, with the film uppermost, is quickly passed through the flame of a spirit lamp, three times, in order to fix the film, so that it may not be washed away during the staining process. It is preferable to hold the cover glass by the edges, between the thumb and index finger, in order that the sensations may guard against the over-heating, which is likely to occur if a pair of forceps be substituted for the fingers, inasmuch as over-heating seriously interferes with the staining of many forms of bacteria.

For the staining, have, in a row, 5 good size watch glasses: in no. 1, place strong nitric acid, 1 part, distilled water 4 parts; in no. 2, place alcohol, 75 per cent.; in no. 3, place alcohol, 95 per cent.; in no. 4, place aqueous solution of methyl blue, so dense as to be just transparent when in the watch glass; in no. 5, place distilled water. Have another watch glass, three-quarters filled with the following coloring fluid:

Of a saturated aqueous solution of anilin oil,		100 parts.	
" " alcoholic "	fuchsin,	13	"
" strong alcohol,		10	"

This mixture is to be filtered, before using, and should be freshly made.

Now float the cover glass, *film down*, upon the surface of the fuchsin mixture. Heat the mixture over a spirit-lamp, until bubbles begin to appear. Remove the heat at once, and allow the cover glass to remain in the hot fluid from two to four minutes.

Then seize the cover glass with forceps, immerse it for a second or two in watch glass No. 1, still holding on with the forceps; immediately immerse it in watch glass No. 2, until the excess of the red color has been washed from the film; then transfer it to No. 3, moving it back and forwards in the alcohol until the film becomes gray and has lost all trace of the red color; now float it, *film down*, upon the blue fluid in No. 4, and allow it to remain one or two minutes. Wash off the excess of color in watch glass No. 5, and stand the cover glass on edge upon bibulous paper to dry, preparatory to permanent mounting in Canada balsam. The preparation may, however, be examined temporarily, before permanently mounting, simply by mounting it in water.

The whole time required for the process of staining, from the time the unstained film is prepared till the stained film is stood up to dry, is only six to seven minutes.

I prefer the red for the tubercle bacillus stain, with the methyl blue for the contrast color, to the usual combination of methyl-violet and Bismark brown, because the common bacteria usually do not stain intensely with the brown, whilst, on the contrary, they stain well with the blue.

In preparing sections of tissues for staining, they should be cut as thin as possible, and stained as soon as cut. Leaving them in alcohol over night makes it very difficult, and oftentimes quite impossible to stain the bacteria. This is a remark which applies to sections of any tissue in which bacteria of any kind are to be sought for.

The staining of sections for demonstration of tubercle bacilli cannot be satisfactorily done by the short method above described. The sections should remain, at least over night, better still, twenty-four hours, in the mixture of fuchsin, and *without heating.* The sections are then subjected to the same treatment as above described for the cover glass film.

Either of the two above named coloring fluids can be used for staining ordinary bacteria in cover glass films. And to prepare bacteria for staining, if not in sections, it is a general rule to spread out the fluid containing them in as thin a film as possible, on a thin cover glass, and then fix the film by heat in the manner above described.

In most cases, except in staining for the tubercle bacillus, bacillus leprae and the bacillus of Lustgarten, the following treatment of the cover glass film is applicable:

Place a drop or two of the selected color fluid upon the film, and invert it upon a glass slide. Allow the fluid to remain thus in contact with the film one to five minutes, according to circumstances. Then with a pipette put a drop of distilled water on one side, at the edge of the cover glass, and on the opposite side place a piece of bibulous paper in contact with the edge. The color fluid is thus drawn out and is replaced by the distilled water. A little further irrigation completes the washing out of the superfluous coloring matter, and the preparation is now ready for immediate temporary examination, or for drying and permanent mounting in balsam.

There are a few species of bacteria besides those of tubercle, lepræ and syphilis, which are somewhat difficult to stain intensely. Among them are those of glanders and typhoid fever. I have found the method of Loeffler of Berlin quite satisfactory for demonstration of the glanders bacillus. It is as follows: The staining fluid consists of:

Methyl blue (saturated alcoholic solution), . .	34 parts
Slightly alkaline water, (1 part soda to 10,000 parts aq. dist.)	66 parts

Stain the film with this in the usual manner. Then wash out the superfluous color in the manner of irrigation, as above described, but, instead of a drop of pure distilled water, at first use a drop from a distilled water which has been acidulated with a drop or two of acetic acid. Finally, wash this acidulated water out well with pure distilled water.

Sections of tissues should be allowed to remain in the above staining fluid from twenty minutes to an hour, or two. They should be washed in slightly acidulated water in order to discharge the superfluous color, and to fix the color in the nuclear elements.

For the demonstration of the typhoid bacillus, especially in sections of tissues, I have found the method of Gaffkey, of Berlin, work very well. It consists chiefly in using, as a coloring fluid, a saturated watery solution of blue or violet, and avoiding the use of *acidulated* water in washing out the excess of color.

(*To be continued.*)

ART XXV.—DISLOCATION OF THE EYE-BALL IN DOGS.

BY DANIEL D. LEE, M. D. V.

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This is of rather common occurence in dogs with prominent eyes, and is generally the result of a fight; I have seen one case which was caused by the dog being struck by a locomotive; no other injury was sustained, and the eye was entirely unhurt except for the dislocation.

On this subject Williams says in his work on Veterinary Surgery: "The method of returning the eye is as follows: After washing away all extraneous matter, dirt, blood, etc., with tepid water, let an assistant, who is to stand behind the dog, open the eyelids as far apart as possible, then the operator is to press gently but firmly upon each side of the anterior aspect of the dislocated globe, with the balls of the thumbs, until the globe is replaced within the orbit. But should such pressure prove ineffectual, the outer angle of the eyelid is to be divided with a pair of scissors,—when the eye can be replaced without difficulty." The incision in the lids closed, he further says that "*extreme pressure* must be avoided, or the eye will be irretrievably damaged;" this I do not think is so unless the eye has been *lacerated* as well as *dislocated*. The eye is found hanging well down on the face, held in place by the conjunctiva and muscles, the last having lost their tone by the extreme tension.

In my treatment I have found that the best way to replace the eye, and that attended with the most satisfactory results is to etherize the dog, carefully cleanse the eye with warm water, and clip away all hair about the parts. Turn the edges of the lids out with a probe, if they are turned in, clip off the eyelashes, and then make *extreme* and sudden pressure on the sides of the anterior part of the eye with the thumbs, following it up until the eye gives a slip back into the orbit; if successful, the eye will remain in the socket and *not* protrude when the thumbs are removed. Now run a probe between the lids and eyeball as far as the reflection of the conjunctiva (conjunctival sinus), bringing it around the eye. This smoothes and folds the mucous membrane into place. The membrana nictitans may protrude from the swelling of the parts and is sometimes permanently returned by the use of the probe, at others it comes out again, but generally retracts after the inflammation has subsided; if not it may be amputated. Having replaced the eye take a stitch in the outer third of the lids as a precautionary measure. Then hold a lump of ice over the parts for a few minutes, or bathe with very cold water; this contracts the parts and makes the muscles of the eye regain their tone, and thus holds the eyeball in place.

Tie the fore legs firmly together with a narrow roller bandage and place a large pad of absorbent cotton over the eye, bandaging it firmly on. Leave this bandage alone for two days; at the end of this time if the operation is to be a success; the stitch may be removed and the bandage left off. The following wash is very good

℞. Sodae Biboratis, gr. x.
Aquae Camp, oz. i.
Sig. Drop 10 m. in eye t. i. d.

If dislocation does *not* recur, a good prognosis may now be given, and if the eye was not lacerated the sight will in all probability be unimpaired. If dislocation returns when the bandage and stitch are removed—it seldom does if the eye was properly returned—it is generally necessary to amputate the cornea and evacuate the media of the eye.

In long haired dogs the stump thus formed is almost entirely hidden and is no disfigurement.

When reduction is not complete at the beginning and stitches are taken in the lids to hold the eye-ball in place, the ensuing swelling pushes the eye-ball against them and they cut the cornea, finally tearing out, allowing the dislocation to recur and making amputation at cornea, or of the entire globe necessary. If extreme pressure is used, I do not think it is ever necessary to cut the lids; if the leison is several hours old the parts may have become very dry and require oiling.

Says Lecoq: "It is only necessary in a fresh eye to squeeze the globe in order to produce a degree of opacity in the cornea which will be more or less great in proportion to the amount of pressure exercised." From this we need not be surprised to learn that the cornea is more or less clouded for a week or two after reduction by this method.

I will add that keeping the dog in a moderately dark room for two weeks is advised, and also that the bandage fastening the fore legs together should not be taken off for three or four days, or the scratching is almost sure to injure the eye.

It may appear that I have written at length on an unimportant subject, but as I have found that these cases are most gratifying when successful and exceedingly disagreeable when failures, I thought that my experience might be of interest.

ART. XXVI.—THE CAUSE OF INFLUENZA-PECTORALIS OF HORSES.*

BY JOHANN W. SCHUTZ, M. D.

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In 1882 Siedamgrotzky divided the inflammatory chest diseases in horses into three parts.

1st, a true catarrhal affection (Bronchitis, Broncho-pneumonia.) 2d, a true inflammatory affection (Croupous pneumonia and pleurisy. 3d, the Infectious pneumonia.

He believed the infections to be due to the influence of an outside agent, which, acting upon the lungs, produced a local inflammation, from which a severe progressive inflammation of the lung tissue and pleura arose, as well as an inflammatory hyperplasia of the bronchial glands, and an infection of the blood and storing up of the material in the parenchymatous organs.

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*Condensed and translated by A. W. Clement, V.S., from Virchow's Archives.

In an infectious pneumonia, the disease of the lung is shown through a croupous-hæmorrhagic exudation, "such as is not seen in a true croupous pneumonia," and that in the inter-lobular tissue an inflammatory œdema, and in the bronchial glands an inflammatory tumification exists.

The infectious nature of the pleuritis is shown by the presence of loosely held together coagula of citron yellow color, in the exudate, in which micrococci are constant, which are not found in the exudate of true croupous pneumonia.

He further divided the infectious pneumonia into,

1st. Inflammations of the lung, due to foreign bodies. These generally produce little inflammatory "croupous" spots in the lungs, and which contain loosely held together micro-organisms (formed ferments), which soon contaminate the softer tissues, and the diseased portion extends further and further.

2d. The inflammation of the lungs commonly found in stall-fed horses; those old horses kept for a long time in the stall. They are especially subject to bronchial catarrh, due to colds. This predisposes them to the infectious pneumonia due to the foul ferments of the over-crowded stable.

3d. The special pleuro-pneumonia which affects young horses in the spring time, which he says begins as a broncho-pneumonia, and from the action of the ferment above spoken of, takes on an infectious form.

4th. Influenza-pectoralis, which only differs from the others in that it is contagious as well as infectious, and that with the exchange of respired air, other animals may become infected.

"On account of the specific nature of the infectious material, it frequently seems hardly necessary to have a preceding catarrh, or the catarrh may follow the working of the contagion itself."

Siedamgrotzky asserts, that as to the nature of the infection of the above mentioned stall miasm, we can only say that in every case the same forms of micro-organisms appear. Most of them are micrococci, which are constant in the croupous-hæmorrhagic exudate, and also found in the inter-lobular tissue, and in the pleuritic exudate, but there are occasionally characteristic bacteria to be seen also. As it seems to be more intensive amongst horses closely stalled, perhaps the infecting material takes on this intensity, by passing through the body of an animal.

He distinguishes, also, between a simple and an infectious pneumonia as follows: By the first we have a fibrinous, and by the second a hæmorrhagic fibrinous pneumonia; moreover, by the first, a slight fibrinous, and by the second a severe sero-fibrinous pleuritis.

Friedberger differentiates between two diseases; between influenza-pectoralis and what he terms the lobar or croupous pneumonia of horses.

The influenza-pectoralis is characterized by the following processes: The pleura furnishes an abundant and often deadly sero-fibrinous exudate. The pleurisy follows a lobular, and in most cases, multiple pneumonia, which ends in necrosis of the diseased lung tissue. Even where these pneumonic spots are quite isolated and only to be found of small size, the infectious involvment of the pleura is often very great.

The croupous pneumonia of horses is analagous to the croupous pneumonia of man. It is a specific infectious disease, and it may affect only one lung. The hepatization must become quite solid, as from the inflammatory exudation the involved tissue is rather hard to break. The cut surface has a general granular appearance. It alternates irregularly between greyish-yellow and greyish-red colored parts, with some dark-red or black-red parts. The inter-lobular tissue seems, especially in the peripheral parts of the inflamed area, plainly infilterated with serum and salts.

In this croupous pneumonia, the pleurisy at the same time present shows no tendency to progress, and especially exists without abundant exudation.

It is interesting to note that Friedberger, early in 1874, found oval bacteria, single and in chains, in the exudate of the pleural cavity. These micro-organisms, he said, grew in the lungs, produced infarcts, and through these reached the pleura, and set up a pleuritis. He spoke of this as a pleuro-pneumonia mycosis. The micro-organisms in the pleural exudate often lay upon, and in the white blood corpuscles. In the diseased portion of the lungs these micro-organisms swarmed. On the other hand, in other portions of the lung and in the pleural exudate he found "Bacterium termo and bacterium subtilles," as in fermenting masses.

Friedberger, later on, declared : By coloring with hamotoxyline, clearly defined sphero-bacteria could be found, and were seen many times in the alveoli filled with fibrinous nets. Whether these were pathogenic or not he would not say.

What Siedàmgrotzky calls croupous (simple) pneumonia and pleuritis, Friedberger describes as lobar croupous pneumonia. In reference to the influenza-pectoralis, on the other hand, both authors quite agree. I must emphasize the fact that accordingto Friedberger and Fröhner, croupous pneumonia as well as influenza pectoralis is an infectious disease, and that these investigators do not either of them recognize a simple, non-infective croupous-pneumonia.

Lustig divides the lung affections of horses into catarrhal and pneumonic, and speaks of a pleuro-pneumonia form of the latter. He considers the cases which Friedberger describes as lobar-croupous pneumonia, as cases of influenza-pectoralis. He inoculated a portion of the inflamed lung, some pleuritic exudate, some fluid from the nostril, some blood and some urine from a case of influenza, on gelatine, horse blood serum, and on potatoes, and obtained a pure culture yellow in color, which, *en masse*, was of a bright yellow to citron color, according as the gelatine was thicker or thinner. At first the surface was clouded and granular, but afterwards became white. It grew very slowly, faster on gelatine than on horse blood serum. They grew in stick cultures, only on the surface or in the fissures, where the gelatine was fissured. The organisms were œrobic. They were small ovoid bacilli; after coloring with gentian violet, they looked like micrococci or diplococci. By the Ehrlich or Ribbert method they were seen to be bacilli. They were abundant in the parmchymatous exudate of the diseased portion of the lung, in the fluid pleuritic exudate, and in the blood. From the blood, Lustig obtained six pure cultures from the same case. The same for the pleuritic exudate. A gelatine culture was made fluid, and injected under the skin of a four-year old horse. A severe inflammatory œdema followed the inoculation; later, the swelling broke. It contained a yellow-colored fluid. Lustig considered these ovoid bacilli as the contagion of influenza-pectoralis.

Dickerhoff believes that the influenza of horses find its analogyy in the croupous pneumonia of man, but, as with him, the disease seldom arises of itself; it must be attributed to the same infectious cause as the pleuritis. There the infectious material is not known, so it must remain to judge the influenza-pectoralis according to the same characters, and especially according to the progress of the individual cases. The separation of croupous-pneumonia, or pneumo-pleuritis, and influenza-pectoralis, as distinctive diseases, is not permissible. The working of the contagium does not show itself according to a definite scheme. The modifications in the character of the disease are sometimes so variable, that one seeks to withhold the influenza for a group of more infectious pneumonias, with different sorts of contagion. The continued observation of the disease for many months will show this hypothesis to be unpermissible. It proves much more than a specific contagion lies at the bottom of influenza, of which the virulence from an unknown cause is sometimes stronger, sometimes weaker, and which, from this especial characteristic, sometimes single disease processes, unlike the more severe, make their appearance. The nature of the infection of influenza-pectoralis is more like the pleuro-pneumonia of cattle.

Dickerhoff further observes, that what Friedberger decribes as lobar-croupous-pneumonia should be reckoned as influenza.

I made some investigations in 1882, but I did not finish my work, because from an anatomical standpoint alone, my conclusions would not be accepted, viz: That there was only one genuine inflammation of the lungs in horses the cause of which is generally distributed, but which only works under certain circumstances in the lung, and which is known to vàry in the degree of its working. At this time I began my first bacteriological investigation, and I hoped, moreover, that proceeding according to the methods advanced by Koch, my conclusions would become known. How far I was successful, further work will show.

INVESTIGATIONS.

Body of seven or eight year old horse. The muscles yellowish-brown and soft.

Mucous membrane of intestine somewhat thickened and grey. Solitary follicles prominent. Spleen not much altered. It was soft, and on section the larger vessels filled with blood; pulp, brownish-red. The mucous membrane of stomach covered with mucous, and in the glandular portion was greyish-brown, thick, cloudy, and somewhat granular. Liver somewhat enlarged, shining and firm; on section it was clay-colored; the acini were very prominent, the outer part grey-brown and cloudy, the inner dark-brown: The knife was covered with fat.

Kidneys enlarged, easily broken; the capsule easily separated from the substance. Surface smooth, dark greyish-red and cloudy.

On section the medullary substance was dark red and cloudy. The cortical substance generally greyish-brown and cloudy.

In the plural cavity five and one-half litres of cloudy dark green fluid, in which numerous large masses of loose texture and yellow color were held. The pluera, in lower part, covered with loose yellow attachment. The surface of the pleura at this spot was covered with red granulations. In pericardium a red, but clear fluid. Many small echimoses beneath the epicardium. Under the endocardium of left ventricle a large blood clot. Heart muscle, yellowish-brown, cloudy, dry and soft. Valves normal. The lungs strongly retracted from the sternum. The anterior lobes of both lungs solid, and attachment between pleura pulmonalis and pleura costalis. On section of the solid portion the surface was dark red, smooth and moist. In this dark-colored tissue was found a cavity about the size of a hen's egg, with fluctuating contents. The contents composed of necrosed lung tissue. In this necrosed tissue many yellow loose masses lentil-sized could be seen. The dependent portions of the lungs and the larger bronchi were filled with a frothy fluid.

This autopsy showed that the horse had a "pneumonia multiple-mortificans." The cavities and yellow spots were the product of an irritant, which had affected the lung in different parts at the same time. The irritant must have been very severe to have caused this necrotic inflammation. Moreover, it must itself have progressed and become installed in the neighborhood to have set up a new inflammation which caused the death of the animal.

The cause must have exerted an influence on the blood as shown by the clouded appearance of the parenchyma.

From my experimental investigation on the Swine plague, I came to the conclusion that the cause of influenza-pectoralis must be a micro-organism, which through the respired air was carried into the lungs, and having arrived at a certain part, located itself and from there progressed further and further.

In a second post mortem similar lesions were found.

In a third, there were no yellow necrotic spots, no cavities, and no pleuritis. The right lung was dark red in color and the left gray. On section of the right lung, the dark red tissue, was beset with sharply circumscribed gray red finely granular and dryer parts. The changes in the other organs were the same as in cases one and two.

Notwithstanding, that there were no necrotic spots and no pleuritis, I shall be able to show that this was infectious pneumonia, "influenza-pectoralis."

I have discussed the well-defined alterations in the lungs of horses, which exhibit this granite appearance, in my work on the "genuine lung inflammation of horses," and I repeat that the red particles which are to be seen in the hæmorrhagic stage, and the gray or gray-red seen in the hepatized stage are indicative of influenza-pectoralis.

From cases one and two, cover glass preparations were made from the yellow spots which lay in the neighborhood of the hepatized portions, and from the exudate mass in the plural cavities. Colored with gentian violet, only oval micro-organisms were found, which were relatively small, and which were surrounded by a substance which sometimes colored, sometimes did not. The organisms lay, sometimes in pairs, sometimes single, sometimes in masses. In hardened sections of lung the same organisms were found; in the contents of of the alveoli, and in the yellow spots they were especially numerous, while on the other hand, they were less numerous in the dark red tissue, and grew less and less numerous as the healthy tissue was approached.

These observations leave no doubt in my mind, that the yellow areas were where the disease first started, and that the masses of dead tissue were due to the progressive invasion of the bacteria.

The lung tissue in case three was also examined, and the same organisms found in the contents of the alveoli, and of the bronchi and trachea.

I make this statement to show that there is no difference from an etiological stand point between influenza-pectoralis and lobor croupous-pneumonia.

A number of bodies were examined, and these micro-organisms always found.

PURE CULTURES.

On gelatine, globe-shaped masses of a white color. They do not make gelatine fluid. On the surface they take the form of little chains.

In flesh infusion they grow mostly in form of chains.

On surface of agar agar are smaller cloudy, gray masses. On the bottom of the glass they appear as gray white deposits.

Stick culture in agar agar grows the same as in gelatine.

With pieces of lung the following animals were inoculated.

2 Rabbits in the ear.	4 White rats in back.
2 Guinea pigs in belly.	1 Hen in the wing.

The inoculation of the rats was carried on to the fourth generation, and all died. Oval bacteria found in all the organs and in the blood. The rabbits took the disease and died. They showed the characteristic bacteria.

The guinea pig and the hen did not take the disease.

In the cavities in horses' lungs, putrefactive bacteria were found in addition to the oval bacteria.

At one post mortem, the fluid was drawn by tapping the chest, and immediately examined. The oval bacteria were found, but in addition, another organism, a chain micrococcus. The chain which these organisms formed, extended from one side of the field to the other in cork-screw fashion. I thought at first, that these cocci gained entrance by the puncture of the chest wall, but I soon came to another conclusion. By the examination of the right lung and the part which lay enclosed in the cavity, I saw that the bacteria of influenza-pectoralis were only in the dead tissue parts of the cavity, while these chain building micrococci were found in great numbers in the pus. Moreover, the thick fluid in the cavity, contained a mixture of both forms, and no other organisms could be found in the cavity.

Through the invasion of the bacteria of influenza-pectoralis, were the necrotic areas produced, and around this part later a sharp line of demarkation was produced. One part which lay near the surface of the lung showed perforation of the pleura, caused by the dissecting suppuration, and in this way entrance was gained into the plural cavity, and pluritis produced. I leave the question open as to whether this micrococcus is identical with the micrococcus pyogenes or not.

It is necessary to differentiate between the process, which brings about the necrosis of the lung tissue, and that which causes the suppuration of the necrotic parts above mentioned. The one is through the bacteria of influenza, and the other through the chain building micrococci.

Both organisms enter the lungs by the respired air, and if there is not suppuration of the lung tissue in every case, the micrococci are not distributed over the whole lung but

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A. C. Salmon.

only in certain parts, or there is not in every case, communication with a bronchus, shows through which the introduction of the organism is alone possible.

A rat, inoculated with the twelfth generation of the bacteria of influenza, died on the following day. Some of his blood was introduced into peptone beef infusion and allowed to stand three days at 358C. By this time the fluid contained a mass of characteristic bacteria. From this culture a two year old horse was inoculated, and in nine days after the inoculation, died of lung trouble.

The post mortem revealed the characteristic lesions, and the special bacteria were present.

Later, two more horses were inoculated with like result.

ART. XXVII.—DANIEL E. SALMON, D. V. M.

CHIEF OF THE BUREAU OF ANIMAL INDUSTRY.

With this number of the JOURNAL we present to our readers the portrait of Dr. D. E. Salmon, the chief of the United States Bureau of Animal Industry, who has been connected with the official veterinary work of this country since Congress first instituted investigations of contagious animal diseases as provided by the appropriation of 1878.

Dr. Salmon was born in Morris county, New Jersey, July 23, 1850. He entered Cornell University at its opening in 1868, being a member of its first freshman class. Here he became acquainted with Prof. James Law, who had just come to America to fill the chair of Veterinary Science at this new institution. At that time there were few who realized the importance of veterinary instruction, or who could see any reason for including such studies among the branches taught by our higher institutions of learning.

It was the aim of Ezra Cornell, however, "to found an institution where any person could find instruction in any study," and with an admirable appreciation of the value of knowledge in regard to the diseases of animals he determined that veterinary medicine and surgery should be well represented in the faculty of the University which was to bear his name.

Very early in his course at Cornell the subject of our sketch became impressed with the importance of the position and work which were soon to be assumed in this country by educated veterinarians. Even then the flocks and herds of the land had multiplied until their numbers were enormous; and many of our States were without a single veterinarian competent to diagnose the most important animal plagues, much less to give intelligent advice for their control. Massachusetts had succeeded only two years before in ridding that State, after a six year's struggle, of an outbreak of pleuro-pneumonia, which might have been stamped out in as many months. The investigation just made by Prof. Gamgee, under the direction of the United States Department of Agriculture, had shown the existence of contagious pleuro-pneumonia from Long Island, N.Y., on the north, to the District of Columbia on the south. The most extensive outbreak of Texas fever which this country has ever known, and which resulted from the wide distribution of Southern cattle over the Northern States in 1868, was then in progress, and was attracting attention everywhere. Hog cholera, although considerably disseminated before the war, was lost sight of for a few years on account of the stirring events of the times, but in 1868 it was again attracting the attention of writers on agricultural and sanitary subjects. These diseases, widely distributed in our own land, and threatening our food supply; with foot and mouth disease and rinderpest ravaging the herds of Europe and liable to be imported at any time, gave unmistakable evidence that our National and State governments would soon appreciate the value of veterinary science.

Dr. Salmon graduated at Cornell in 1875 with the degree of Bachelor of Veterinary Science. The same year he visited Europe, and after remaining two terms at the French veterinary school at Alfort returned to America and began the practice of his profession in Newark, N. J.

In 1875, on account of impaired health, he went to Asheville, N. C., for the benefit of the southern mountain climate. In 1876 Cornell gave him the advanced degree of Doctor of Veterinary Medicine. In 1877 we find him non-resident lecturer on Veterinary Science in the University of Georgia.

The appropriation by Congress in 1878, of $10,000 for the investigation of animal diseases, led to the appointment of a number of veterinarians, including Dr. Salmon, who were directed to devote two months to the study of swine diseases. The reports of these investigations were published by the Department of Agriculture in a special volume in 1879. It was not expected that this brief investigation would solve all the problems connected with hog cholera, but it was hoped that certain leading questions, such as its nature, cause and identity in different parts of the country would be settled, and that some practical measures of prevention would be suggested. To this extent the inquiry was successful, and it was demonstrated that there was a specific, contagious disease of swine widely disseminated over the country, and that prevention could only be accomplished by controlling the spread of the contagion and destroying it wherever found.

The State of New York attempted to stamp out contagious pleuro-pneumonia in 1879, and Dr. Salmon was appointed on the veterinary staff as an assistant of Prof. Law. The spring and summer were devoted to this work, but with the exhaustion of the appropriation in the autumn, he accepted a commission from the United States Department of Agriculture to investigate animal diseases in the Southern States, and was instructed to make a specialty of Texas or Spanish fever. He then began that extensive series of studies of cattle diseases in the South which demonstrated the identity of the "distemper" of Virginia and North Carolina with the "murrain" of Georgia, Alabama, Mississippi and Tennessee, and with the Texas fever of the Northern and Western States. During the investigation he directed a careful survey of the whole country, from the Atlantic seaboard in Virginia to the Rio Grande river, accurately outlining the district permanently infected with this contagion, and showing that northern cattle taken into that district contracted the same disease that was disseminated by Texas and other Southern cattle when taken North.

In 1880 he began the investigation of fowl cholera, demonstrating that the germ found in that disease was its essential cause, that it could be made to multiply locally and act as a vaccine by simply diluting the virus to a sufficient degree. He also at this time formulated a theory of immunity from contagious diseases, based upon numerous experiments, in which were foreshadowed a new method of prevention through the use of chemical substances formed during the growth of the specific germs. This method has since been satisfactorily demonstrated by experiments made under his direction, and he is still at work upon the details which must be learned before it is put into practical operation.

Early in 1883 he was called to Washington by Commissioner Loring to establish a Veterinary Division in the Department of Agriculture. In doing this a plan was adopted for an extensive investigation of animal diseases, a laboratory for histological and bacteriological research was fitted up, and seven acres of land near the city were rented for an experimental station. Within a year Congress passed an act establishing the Bureau of Animal Industry, and Dr. Salmon was at once appointed Chief of this Bureau, a position which he still holds.

Since he has been in the Department of Agriculture a large number of investigations have been made under his direction. In 1883 he was appointed by President Arthur a member of a commission to investigate the quality of our pork products and the prevalence of trichiniasis, and his report on this subject has been received without question. In 1884 he investigated the supposed outbreak of foot-and-mouth disease in Kansas, Missouri and Illinois, and allayed apprehensions by deciding it to be ergotism. In the same year he discovered and traced out an outbreak of pleuro-pneumonia which extended to Ohio, Illinois, Kentucky and

Missouri, and succeeded by co-operating with State authorities in securing its extermination wherever found. It has since been discovered, however, that it had crept into Chicago unobserved, where it smoldered for two years and was brought to light by the State veterinarian in September, 1886. The Bureau of Animal Industry now has a force of Inspectors engaged there for its suppression.

Since its organization the Bureau of Animal Industry has made an inspection of the district from Long Island, New York to Virginia to determine the extent and prevalence of pleuro-pneumonia. In August, 1886, an agreement of co-operation for stamping out this disease was made with the State authorities of Maryland, and the slaughter of diseased animals has been going steadily on. In March of this year, an appropriation of five hundred thousand dollars was made to the Bureau, and the work extended to the slaughter of exposed as well as of diseased animals.

New and efficient rules and regulations for co-operation with State authorities were at once prepared and sent to the Governors of the various States for their acceptance; and in States where no laws existed authorizing co-operation a suitable bill was drawn and presented to the legislature for its consideration. As a result of such energetic work more than half of the States have already given the Bureau full authority to stamp out the lung plague should it be found within any of their borders, and hardly sixty days have passed since the effort was begun. This work is now in active progress in the States of New York, New Jersey, Maryland, Virginia and Illinois.

While this executive work has been pushed so successfully, the scientific work of the Bureau has not been neglected. In the report of 1885, the first accurate description was given of the germ of hog cholera and of the lesions which it produces in swine and other animals. Since then another swine disease resembling or identical with the *schweineseuche* of Schutz has been studied and will be fully described in the forthcoming report for 1886. A thorough study of the entozoa affecting the domesticated animals of the United States is also in progress, and is yielding very important results.

In addition to this work, which comes strictly within the province of the Bureau of Animal Industry as defined in the act of Congress establishing it, the quarantine of imported animals, formerly in charge of the Treasury Department, is now under the direction of Dr. Salmon.

As a recognition of Dr. Salmon's labors in behalf of Veterinary Science, the Royal College of Veterinary Surgeons of Great Britain has recently conferred upon him the degree of Honorary Associate—the highest professional honor which that body can bestow. He is also a Fellow of the American Association for the Advancement of Science, and Chairman of the Committee on Animal Diseases and Animal Foods of the American Public Health Association.

W. J. C.

EDITORIAL DEPARTMENT.

RECENT RESEARCHES ON SCARLATINA.

BY WM. OSLER, M. D.

Several very important investigations are in progress in Great Britain relating to the etiology of this disease. Klein, of London, has attempted to prove a connection between a certain disease of the cow and scarlatina. Mr. Blyth traced an epidemic to the milk coming from a special dairy farm at Hendon, and on investigation it was found that some of the cows had sores on the skin and ulcers on the udder and teats. As described in the British Medical Journal, "the disease is ushered in by a short initiatory fever, a dry, hacking cough, sometimes quickened breathing, sore throat in severe cases, discharges from the nostrils and eyes, an eruption on the skin around the eyes, on the hind quarters and on the teats and udder, this eruption being in the form of vesicles or bullæ." Cultivations were made for micrococcus from this disease, and a similar affection was produced in calves, with post-mortem lesions resembling those of human scarlatina. Klein has obtained a micrococcus of similar characters in the blood and tissues of the subjects of the human disease. He claims also to have found the organisms in tins of condensed milk, which were suspected in connection with an epidemic of scarlet fever. Professors Axe and Brown of the Royal Veterinary College, are investigating the subject, and we shall await their report with interest.

Meanwhile, Drs. Jamieson and Edington, of Edinburgh, have issued an elaborate report on the Contagium of Scarlet Fever and described a diplococcus and a bacillus. Inoculations of the latter causes in calves fever, with a red dry rash, followed by desquamation. It does not appear that direct inoculations of the calf with scarlatinal blood have been made to ascertain if a disease similar to the Hendon affection could be produced.

It is probable that we are on the eve of important discoveries which may enable us to recognize the cause, and so help in the prevention of this dreaded scourge.

VETERINARY DEPARTMENT—UNIVERSITY OF PENNSYLVANIA.

We had always been proud of the Commonwealth of Pennsylvania as a great agricultural State, for we knew that the agricultural industries of the Commonwealth paid four-fifths of the taxes, and that the Granger vote was an important element in State politics ; but our pride has had a fall. We had already commenced an editorial to notify our readers that the Legislature of Pennsylvania had passed an appropriation of fifty thousand dollars for the construction of new buildings on the grounds of the Veterinary Department of the University of Pennsylvania. We expected to advise the student from away, that dormitories would await his coming. We planned that cattle stables should furnish opportunity for practical instruction in obstetrics and zootechnics. We were ready to announce a farriery, where blacksmiths could come and in a three months' course learn that one subject so essential, but almost unknown to them, the principles of the horse's foot. Eight free scholarships were to have a perpetual foundation. All these could have been supplied to the public by the fifty thousand dollars which the representatives of a great agricultural state willingly voted for, urged to do so by their constituents, and only by an accident failed to make it one hundred thousand. The latter sum would have completed the institution with a botanical garden, where the veterinary student could learn to recognize the crops that grow on his patron's farm, the indigenous remedies and noxious weeds, which are found wherever the practitioner is called to see a herd of cattle or a flock of sheep.

However, His Excellency, the Governor of the Commonwealth, found a Hahnemann School and a Mushroom Medical School in Philadelphia, which has not a dollar invested, more needful to the public good, and placed his veto on appropriations to the Veterinary School, the State Agricultural Society and for the meeting place of the State Grangers. The failure to obtain the means for the necessary additions to the Veterinary School, occurred at a critical moment and will prove a serious inconvenience, but only a temporary one, as the entire people of Pennsylvania showed great interest in this undertaking, and when once they appreciated the scope which veterinary medicine is capable of, realized the absolute necessity it is to the country.

We can, however, announce with pleasure the graduation of the first class. Ten gentlemen received at the commencement of the University of Pennsylvania, on June 8th, their diplomas—"Veterinariæ Medicinæ Doctor." At the opening of the Veterinary Department three years ago, thirty-three matriculants were found on the roll. During the first year sixteen found the studies more than they anticipated, and failed to pass their examinations; the second year's examinations reduced the number to thirteen, and ten successful candidates were the result of the final examinations, after twenty-seven months' study. The fine physical appearance of the new veterinarians was the subject of much comment and applause as they walked on the stage of the Academy of Music among the two hundred students of the other departments, who were also receiving the reward of their respective studies. This commencement marks an era in the advance which veterinary medicine has been making in the United States for the past ten years. The public reception of these men, side by side with the graduates of other scientific branches of study, will do much to break down the last vestige of the vulgar prejudice which has existed in regard to the veterinarian.

H.

AN EXPLANATION.—The *Veterinary Journal* for March contains a communication from "Amicus" in which Dr. Burke, of India, is bitterly attacked for having expressed his high appreciation of the *Journal of Comparative Medicine and Surgery* in a letter to the editors of that periodical.

"Amicus" also accuses us of having published an extract from this letter as an advertisement. The accusation is entirely false, the extract in letter form, having been sent only to a few friends of Dr. Burke's in England.

The May number of the *Veterinary Journal* publishes a reply from Dr. Burke in which he says: "Without attempting to discuss the reasons for my opinion regarding the merits and general finish of the journal in question, as it is now issued by its present editors, I may only refer to your own (the editor's) remarks in the journal for March, which should be a sufficient guarantee in itself to secure a not too narrow circle of readers for the *Journal of Comparative Medicine and Surgery* wherever the English language is spoken.

"I may inform 'Amicus' that, were he to publish a journal of the same scientific tone and high standard as the one referred to, I would gladly subscribe for it as for any other of equal merit."

The editor's remarks on this journal referred to above, are as follows:

"In October last, what might be designated a new series of this quarterly periodical was begun, and the alterations which have been made in its arrangement and production will render it yet more acceptable to the wide class of readers it commands as a representative scientific journal of its class." C.

HYDATIDS IN A CAMEL.—In the winter of 1883, while Demonstrator of Equine Anatomy at the Columbia Veterinary College of New York, I had occasion to examine the viscera of a camel that had died at the Central Park Zoological Garden. In the lungs, liver and mesenteries were a number of spherical masses which proved on further examination to be hydatid cysts. The largest had a diameter of 3 c. m;; others were nearly as large. The identification of the cystic contents was made by Dr. Satterthwaite of the New York Post Graduate Medical College.

These hydatids can in no way be accounted as indigenous to this country, for the cysts are of slow growth and the camel may have been infected before arriving on our shores.

COOPER CURTICE, D. V. M.

CASE DEPARTMENT·

AUTOPSIES AT CENTRAL PARK MÈNAGERIE.

CHACMA BABOON—*Cynocephalus porcarius*, *Hab.* West Africa. General emaciation.

Thorax.—Left. No adhesions. *Lung*-congested and rather solid. A few pin-point-sized tubercles in *pleura.* Abundant firm adhesions over lower part of lung. Well marked cheesy degeneration; one mass is filbert sized. *Right lung.*—Same. *Pleura.*—Costal, diaphragmatic and visceral; is infiltrated with pin-head sized greyish nodules. *Abdomen.—Omentum* contains moderate amount of fat; no adhesions. *Liver.*—Capsule shows a moderate number of pin-point to pin-head-sized tubercles. Organ fatty and congested. *Kidneys.*—Congested. *Mediastinal and Abdominal Lymphatic Glands.*—Swollen and congested. Many contain cheesy degenerated centers. *Intestines.*—Moderately congested. Large intestine contains a number of pea-sized, blackish-brown tumors, cheesy at the centres. No ulcerations. *Diagnosis.*—General tubercular infection. Death from exhaustion.

PARADOXURE—*Paradoxurus bondar*, *Hab.* India. The interesting point is the intestinal obstruction which caused death by starvation. In the large intestine was an intussusception, half an inch in length, but without any peritonitis. It probably occurred during the last hours of life.

The small intestine, however, was stuffed with *hair-balls*, so as to completely occlude its lumen. The jejunum was chiefly involved, andwhile the stomach and duodenum contained a large amount of semi fluid food, the ileum and the large intestine contained only a little mucous. The substance of these hair-balls were so densely matted together that they could hardly be cut with the scissors. One was 2x1-2 inches in size, and another larger one was wedged into the intussuscepted portion of the large intestine.

In all five of these hair masses were found. All other organs were normal.

Diagnosis.—Intestinal obstruction by hair balls. *Cause of death.*—Inanition.

OCELOT—*Felis pardalis*, *Hab.* South America. Poor condition. Fur loose. Skin blood-stained over abdomen. *Lung.* Acute pneumonia the immediate cause of death. The entire pyloris end of the stomach was filled with a large irregular ball of hair, 2 1-2 by 1 1-2 inches in size. It almost entirely blocked the entrance to the duodenum. It is of interest in connection with the last case, and the two go to show the frequency of intestinal obstruction in these mammals from this habit of licking their coats.

BEAR—*Ursus americanus, Hab.* North America. Dead thirty-six hours. Apparently sick for several days, showing signs of uneasiness. Fairly fat. *Thorax.—Pleura* moderately thickened. *Lungs.*—Base, left, acute congestion. *Heart.*—R. auriculo, ventricular valve nodular, thickened and covered with warty growths. *Endocardium* of L. heart, thickened; base of L. auriculo-ventricular valve adherent to wall of auricle. Closure imperfect. *Stomach.*—Full of watery fluid; no food. Contains five peach stones, one of which is impacted in the pylorus and fills it.

The entire mucous membrane of the whole stomach is intensely inflamed. For four inches back from the pylorus the stomach is enormously thickened, the increased tissue being chiefly of the middle coat. It is a grey, translucent material, moderately hard. It is disseminated through the whole area involved, but forms a large ring-shaped mass around the pylorus, especially on its posterior wall. The posterior part of the ring nearest the orifice has a projection or nipple, half an inch in height, tending to close the orifice. Between the nipple and the contracted pylorus lies the peach stone. *Intestines.*—Intensely inflamed in places. *Liver.*—Congested and fatty.

Diagnosis.—Colloid carcinoma of stomach. Ac. Gastritis. Intestinal obstruction by peach stones. *Cause of death.*—Exhaustion.

WILLIAM S. GOTTHEIL, M. D.,
New York City.

II.—FRACTURE OF RADIUS IN BROOD-MARE.—*Amputation and Recovery.*—On April third I was called to the country to see a brood-mare with a fractured forearm, and found the following interesting case, which demonstrates the fallacy of the rapid unfavorable prognosis and slaughter which usually takes place when a valuable breeding animal breaks its leg.

April 3d, 11 P. M.

Gray mare, 15 1, 10 years old, within six weeks of foaling, having been covered in June last by a valuable horse. The mare had been turned into the barn-yard the morning before, and was found in a half hour with a fractured forearm. She was standing in rude slings, which pressed too much on the abdomen, and rendered her very uncomfortable. The off front leg was encased in a splint which had been admirably applied by the family physician. On removing the splint, I found a compound comminuated fracture of the lower end of the radius. The leg was considerably swollen and very painful. On attempting to examine the fracture the mare reared, dropped backward from the slings on to her sound side, from which it was impossible to raise her, as all but one attendant declined positively to see the animal suffer. I reapplied the splint, and early the following morning reported to the owner, that the only possible means of saving the foal would be amputation. April 4th, 8 A. M. mare on near side, nervous and suffering greatly; has been sweating constantly through the night. Straining somewhat, but movements of fœteus can be felt. Hobbled hind legs and near (under) foreleg with ordinary barn rope; had head restrained by bridle and twitch. Made rapid circular operation in middle of forearm, cutting the skin and subcutaneous tissue in first sweep, the superficial layer muscles in second, and with the third, cut the the deeper muscles to the bone, sawed the bone with a saw borrowed from the farm kitchen, which was previously flamed to cleanse it. Was only obliged to ligate the anterior and posterior radial arteries, the remaining hæmorrhage answering promptly to cold water, rendered antiseptic by the addition of a small quantity of bichloride of mercury. United soft parts by two deep sutures leaving drainage at corners. Lifted mare to her feet and placed a loose narrow sling, under thorax. In an hour the mare had cooled from her sweating; was much less nervous, and ate a handful of oats, drank water and picked at a bundle of hay. A great deal of trembling continued in the near foreleg from the strain imposed upon it, as the animal declined to give herself much support from the hind legs. Left orders that the slings should be removed at night and the mare turned loose in her box stall.

During the following three weeks the animal was let down at night, and supported with slings in the day time, once or twice she was allowed to remain on her side for more than a day, and swelled a good deal in the mammæ and gentils.

April 24th, 10 P. M. Found wound almost healed, but muscles considerably contracted, allowing protrusion of bone which is, however, covered with a dense fibrous tissue. Find that animal has been constantly in slings during the day time, and that she depends on them, throwing the entire weight of the anterior part of the body into the canvas, instead of using her leg. Find also that she has given great trouble in having to be lifted to her feet each morning. Removed slings, in which mare was falling asleep. After several attempts she got down, showing, however, a great deal of caution for the amputated leg. In a few moments she was sound asleep.

April 25th. Animal on side bright; lifted head on our entrance into the stall, got herself ready to be lifted up, but refused to give any aid. Placed a bridle on her, struck her suddenly with a whip and she got up without aid. Walked her into barnyard and turned her loose. On May 1st she foaled without trouble, and is now at pasture with a healthy foal beside her. Before foaling, the mare used her hind legs but little for support, but since she no longer has to protect the abdomen, she has assumed more the gait of a foundered horse. The long stump of bone was obligatory on account of the awkward saw, which was the only one at hand; constant irrigation was not possible, but the animal received frequent bathing and excellent nursing.

In the above case the pregnancy proved a serious complication, but the animal fortunately had great courage. In future cases, I would advise but little use of slings, as the animal should learn to depend upon itself at once. In the case of a valuable breeding animal, amputation is certainly no more serious than a severe quittor or pricked foot. R. S. HUIDEKOPER, Veterinarian.

III.—INFLUENZA, CATARRHAL FEVER, &C.—As some, to me, interesting and strange complications have arisen in my practice from the above diseases, and may also prove of interest to readers of the JOURNAL, I send the following account: "On Feb. 28, 1887, I was called to treat a half-bred stallion, suffering from what they called "Pink Eye." On examination I found him with well marked symptoms of sore throat, eyes swollen, with a slight discharge of pus from the eyes and nostrils. He made a good recovery. In a few days, another stallion, one of the fashionable Daniel Lambert stock, developed same symptoms, but in about a week, to all appearances, regained his usual health. They were in a training stable, along with twelve other horses, and in a short time, every horse in the stable was affected in the same way; they all recovered except one, a valuable grey trotting mare, which died. The stallions were removed to their own stables, where I saw them occasionally. On the first of May they entered the stud, feeling and looking, so owner said, better than usual, at beginning of season. They were used to some forty mares, and *in every instance*, the mares that were covered by them, were attacked by the same disease from which the stallions suffered in February. The owner was obliged to withdraw the stallions, as it raised quite a disturbance among owners of the mares, some of whose young colts at their sides contracted the disease and died from it. These cases have puzzled me a good deal, as I have had considerable experience of above diseases in my practice, and never met with any case before, where the stallion would communicate it to mares. In 1874 I treated a large number of horses in Canada, among them a number of stallions, but never heard of them communicating it during the season ensuing. I trust the above may be of sufficient interest to the JOURNAL'S readers to induce them to communicate anything unusual in regard to above, that may have arisen in their practice.

R. LOVELL, V. S., Potsdam, N. Y."

SELECTIONS FROM FOREIGN PERIODICALS.

CHANGES PRODUCED IN THE LUNGS OF SHEEP BY A PARASITIC WORM, (*Strongylus filaria.*) By Henry Bewley, M. B.—*Journal of Anat. and Phys.*, April.

On several occasions lately some sheep's lungs have been obtained for the Physiological Laboratory in Trinity College, Dublin. Prof. Purser drew my attention to the presence in many of these lungs of small nodules or tubercles, whitish-grey in color, some about the size of a small shot, others larger, being as much as one-eighth inch or more in diameter, In fact, they much resembled the miliary tubercles seen in human lungs in cases of acute tuberculosis. They existed in large numbers, both on the surface of the lung, immediately under the pleura, and also in the deeper parts of the organ. They seemed to be especially numerous along the thin edge of the lung, where they formed small, hard, shot-like elevations. The surrounding lung tissue seemed healthy. From some nodules in a fresh lung, by tearing them up with needles, I obtained some specimens of the entire *Strongylus filaria.* Two of the worms were respectively fifteen and seventeen milimetres long, and very slender, appearing hair-like. I could not find any trace of reproductive organs. There was a curious arrangement of the intestinal canal in the middle part of these worms, which is not like that in any other nematode I know of. The anterior path of the intestine is quite straight; the middle part is coiled into a regular corkscrew-like spiral; the posterior part is again straight. It is common enough for part of the intestine in nematodes to be alternately constricted and dilated; but I have not been able to find any drawing or description of a regular spiral arrangement such as exists in these worms. Leuckart and Baillet allude to the nodules which these worms cause in the lungs, but they give no details of their histological structure. The adult and mature forms, of which these are the embryos, are from 50 to 100 millimetres long, and inhabit the trachea and bronchi of sheep and goats, where they cause bronchitis. The females are viviparous, and give birth to minute worms about six milimeters long. These, having crept or having been coughed out of the animal's mouth, pass, according to Leuckart, into the body of some insect or snail, where they undergo further development. Afterwards they are again taken into the mouth of a sheep, probably with moist grass, and from its mouth or œsophagus creep into its larynx and trachea. In ruminants this can the more readily occur, because the food, having been swallowed, is brought up a second time into the mouth. The life-history of these worms from the time they are taken into the sheep's mouth to that when they are found as full-grown sexual worms in the bronchi, does not appear to be well known. I do not think that the being encysted in the lungs forms any stage of their normal life-history. It seems more probable that they normally remain in the trachea and there develop to full maturity, and that the individuals which are found in the nodules in the lungs have, so to speak, lost their way among the tissues of their host, and that they remain in the nodules till they die. This view I think probable, because: 1. A good many of the nodules contain, not living worms, but the remains apparently of dead worms. 2. All the worms in the various nodules are about the same size, and none appear to be more fully developed than the rest. 3. It is not easy to see how these worms could escape out of such nodules as these, and bore their way through the lung tissue till they arrived at a bronchus of sufficient size to contain them.—*Medical Abstract.*

ON THE PHYSIOLOGY OF THE SEBACIOUS GLANDS. By Dr. Max Joseph, Berlin.—*Centralblatt fur Physiologie* for April, 1887.

The object of the author is to establish the importance, from the standpoint of comparative physiology, of the sebacious glands secretion in the lubrication of the hairs and feathers. He quotes Professor Liebrich's discovery (Berl. Klin. Woch., 1885, No. 47) of the large amount of cholesterine fat in the epidermic cells, and asks whether this intra-cellular fat is absolutely sufficient for the normal preservation of hairs and feathers, or whether the additional fat of of the sebacious glands plays an important part.

To settle this question he determined to operate. It would naturally be impossible, he says, to exterpate the sebacious glands where they are distributed over the whole surface of the body, as is the case in the sucking animals; but, fortunately, we have in birds the breast glands (Bruzel drussen), which are the equivalent of the sebacious glands in sucking animals. These glands are very easily exterpated. In the animals operated upon, healing generally took place by first intention in a few days. There was no functional disturbance and no deaths followed the operation.

His next experiments were to determine what effect water would have upon them under their altered condition. For this purpose, several more ducks were operated upon. In about ten days after the operation they were weighed, then immersed in a large tub of water, and immediately weighed again. The animals were then allowed to move about freely in a large room, to shake off the water from their feathers, and in about a quarter of an hour they were again weighed, this time each animal separately. The same methods were adopted with a number of normal animals taken for control.

The amount of water taken up was about the same in each case, viz: an average of 465 grammes for normal ducks which had been operated upon. On the other hand, however, after a quarter of an hour's shaking off of the water, there remained in the feathers of normal ducks 56.6 grammes, and in the feathers of ducks which had been operated upon 137.7 grammes.

The inference drawn from this experiment is that normal ducks, and those which have been operated upon, take up about the same amount of water, but that the latter retain from two to two and a half times more water in their feathers than do sound animals. Normal ducks, moreover, required but a slight movement to dry themselves, while ducks which had been operated upon, required to shake themselves very energetically, and for a long time, before their feathers were free from water.

The author omits to state his conclusions until he has finished his whole series of experiments.

A. W. CLEMENT, V. S.

RUPTURE OF THE AORTA.—Halle (Archiv. fur Wiss. Prakt. Thierheilkunde, Bd. xii., 3 and 4 Heft, 1886) saw a case of rupture of the aorta in the horse, which was sent to him to be treated for what was believed to be the result of severe beating of the animal by the groom. After examining the horse, Halle found, between the thirteenth and fourteenth ribs, about twelve cm. from the spine, a wound, about one cm. in length, discharging a yellowish matter. The wound led in a straight direction to a large saccular termination. To give vent to the contained matter, he freely opened the wound from below. Marked hæmorrhage followed this operation, which could not be checked. The animal died in a few minutes from excessive bleeding. On post mortem examination, he found below each saccular dilatation, an enlargement of the size of a man's head, which was situated more to the left of the above saccule, and was separated from it by the peritoneum only. The enlargement contained a solid, blood-stained substance and completely encircled the posterior aorta; the inner half of the aorta had ruptured nearest to the enlargement. Through the operation on the enlargement, the aorta, which was separated merely by peritoneum, was reached, and hence the bleeding which followed. Further examination of the body revealed two other enlargements near the kidneys, and which were connected with the first-named enlargement by tubular channels.

GANGRENE IN THE HORSE. By MM. Cadeac and Maley. *Revue Veterinaire*, Nov., 1885.—The case of gangrene following the stoppage of circulation in a limb, in consequence of arterial plugging, is not often observed. Although cases have been met with, the condition is very rare and none have been recorded in text books, so far as we have been able to ascertain. In an old horse, put aside for surgical operations, MM. Cadeac and Maley only recently noted this condition as "unique in veterinary practice." They found the lower part of the off hind limb œdematous and cold. The hair about these parts could be removed in handfuls. Autopsy showed that this gangrene of the whole of one extremity was due to the destruction of the iliac artery, external and internal of the right side, by an old blood-clot stratified and adherent, which was prolonged into all the divisions of the above arteries, without completely obstructing them, and being broken at different points. Microscopic examination showed, that the finest arterioles were plugged by the blood-clot. The inner coat of the vessels plainly showed the changes wrought by inflammation, of old-standing in some points and more recent in others. In consequence of the stagnation of blood in the vessels, hæmorrhages were produced, principally in the muscular interstices of the upper part of the limb. These authors have not been able to note the complete symptoms of this case, but, such as it is, their observation merits record in this connection.

EMBOLISM OF THE BRACHIAL ARTERY. Bayer. Oesterr. Vierteljahr, fur Wissensch. Veterinarkunde, 1883.—Embolism of the brachial artery shows itself by lameness on the affected side. The animal, during progression, stumbles, makes false steps, stamps constantly with the toes, or often points them in the stall and cannot flex the joints properly, but drags them stiffly along, trembling on the affected side, and occasionally falls to the ground during progression. There is no heavy breathing, no palpitation, and no swelling of any kind. After a short time the animal suddenly revives again. In a case recently under treatment of the translator, the symptoms were at first mistaken for those of cerebellar disease, as in the early stage a prominent symptom was false stepping from disordered muscular action in the limbs. Bayer recommends massage, or a kneading of the thrombus, in the treatment of these cases, through which softening and absorption follows. By methodic massage of the animal the heart muscles can be strengthened, which raises the blood pressure, the clot of blood may be removed. The animal should be rested for a few weeks, and massage, during which time has given very satisfactory results. But standing an animal too long without massage frequently aggravates the symptoms. Internally, the iodide of potassium, ergot and acetate of lead should be prescribed in full doses.

ANEURISM OF THE PHARYNGEAL ARTERY.—M. Blaise, (*Recueil de Med.*, *Veterinaire*, 15th Aug., 1886, p. 604), veterinary surgeon in charge of the Remount Depot at Blidah, describes a case in the horse which showed swelling and induration in the region of the throat and under the maxilla, which had softened in several points, producing ulcers simulating farcy buds. There was present a frothy and profuse discharge of saliva from the mouth, having an offensive odor. Vesicants and cauterization were applied externally, and acid gargles for the mouth used, and antiseptic fumigation of the head. Under this treatment, the animal appeared to improve for a time, when, suddenly, it became worse, and died from hæmorrhage. Autopsy showed the heart, lungs and brain were healthy. Mucous membrane of the trachea showed a greenish tint; that of the pharynx was abraded and showed ulcerated points; towards the middle of the left side of the pharynx, one of the numerous ramifications of the pharyngeal artery became exposed to the length of 3 cm., by the disappearance of the mucous tissue, had dilated itself so readily, that the cellular tissues had disappeared by a slough. The pent up blood had determined an aneurism, rupture of which was inevitable. R. W. BURKE, A. V. D.

IMPREGNATION. By Dr. Fauville, Bulletin of the Society of Anthropology of Paris, 1886.

By "impregnation," Dr. Fauville means the influence which a first fecundation may exercise on those which follow, whatever the origin. In the facts, which it explains, many only see cases of atavism, of distant and unknown origin, whilst it is to be believed, on the contrary, that it is a real and general fact. In order that the "impregnation" shall be produced, four conditions are indispensible.

1st. That the fœtus presents the constitutional characteristics of the father.

2d. That the characteristics exist in its blood.

3d. That there is exchange of liquid between the mother and the fœtus.

4th. That the nourishing liquid of the mother has an influence on the ova contained in her ovaries.

The first three of these conditions are always found, and it is therefore physiologically possible that the fœtus transmits to the mother the characteristics which it receives from the father. This transmission taking place by the intermediary of the nourishing liquid, it is natural that the ova which she bears participate in the modifications undergone by the active elements which constitute her. The effect of the fœtus is the effect of the medium and nothing more. The mother will become acclimated or will succumb; but if a variation can result, it will not manifest itself on her, but on later progeny. Thus a white woman impregnated by a negro, shows no change herself; the variation will manifest itself only on the children which she will have later by a white man.

VACCINATION AND DISTEMPER IN DOGS. *Recueil de Med. Vet.*

The analogy of the cutaneous eruptions in distemper in dogs, with those of variola, was noticed by Jenner, and suggested to him the idea of vaccinating dogs to preserve them from the distemper. "It appears," he says, "that dogs are very susceptible to vaccination by inoculation, and that it produces in them all of the symptoms of distemper which is common to them, but in a foreign form, from which they do not die. They are, moreover, protected from future attacks. Out of forty-three puppies vaccinated with success none died. All were immune from contagion.

Wasbot found that distemper was inocuable, and verified the analogy with variola, but found they could contract the disease later. Dupuis, of Brussels, has just made a complete report on this subject. His experiments were made by scarification with vaccine matter, prepared at the vaccine establishment of the Crueghem School. In all dogs, young or old, whether they had had the distemper or not, the inoculation succeeded, the pustules were well formed on the eighth or ninth day, dessication commenced the eleventh or twelfth; in all, reinoculation was *without* effect, proving that the subject possessed immunity against vaccinia.

Inoculation in the veins, or by hypodermic injection, in all cases conferred immunity without producing an eruption. The vaccination has in no case proved preservative against the distemper.

The work of Dupuis establishes:

1st. That vaccinia is transmissible to the dog, and that a first inoculation protects the dog from the effects of a second.

2d. Vaccination does not protect the dog from distemper, and that distemper does not protect from vaccinia.

R. S. HUIDEKOPER, Veterinarian.

HISTORY OF A TUBERCULAR ABSCESS IN THE VERTEBRÆ COLUMN OF A COW. By Dr. C. Verstreten, Annals et Bulletin de la Societe de Medecine de Gand, February, 1887.

Our colleague, M. Remy, lately exhibited a pathological specimen that was highly instructive as revealing certain peculiarities of Pott's disease, and the accompanying compression of the spinal cord. Heretofore, it was generally believed that the paralysis and the constrictive neuralgia which results from Pott's disease were due to a decay of the vertebræ column, and this opinion is still accepted by many writers on the subject. The fact, however, is that such paralysis and neuralgias are rather rare, for many persons are afflicted with Pott's disease who are not paralysed, nor are they troubled with constrictive pains, and in the case of the few who have suffered from these morbid conditions, both disappeared while the organic difficulty still remained. Moreover, cases are on record in which paralysis existed, the result of pressure exerted on the cord by tubercular abscesses, without any deformity of the vertebræ column itself. The fact which interests us at present is that the prominent features of Pott's disease, as it occurs in man, are identical with those in the lower animals, and that the degeneration of the nervous tissues are entirely similar. In the specimen submitted for examination, it is worth while to observe that in view of the large and numerous abscesses which existed in the vertebræ bodies, we would naturally look for an irruptional pus into the rachidian canal, and in this manner account for the compression of the spinal cord. A subsequent examination proved that such an occurrence had actually taken place. On examining more closely the specimen under consideration, we find that the cut surfaces of the vertebræ bodies contain numerous cheesy centres or foci of variable dimensions, and that these in the first state present a rose-colored appearance. If we enucleate one of the centers we bring to light a softish tumor, partly smooth, and in part covered with tufted villosities. This appearance is due to the soft covering of the tumor as lodged in the vertebræ body. This covering, about half a millimetre in thickness, adheres loosely to the adjacent bone tissue. At certain points this adherence is closer, and if we attempt to detach the fibrous from the bony wall we see long filaments of connective tissue stretching between the two which serve the purpose of feeding the tissues by imbibition. The interior of the bony receptacle is sometimes smooth and again studded with fine bony excrescences which fill up corresponding depressions in the tumor. The bone tissue which envelopes these tumors, is denser than usual, and possesses an ivory appearance. This hardened condition of the bone contributes largely to the consolidation of the diseased vertebræ, and accounts for the preservation of the normal outlines in rachitic maladies. Moreover, this unusual osseous induration occurs only where its effects are most needed, for in the case of small abscesses it is not perceived.

These large rose-colored abscesses contain a creamy substance of a certain consistency, and almost uniformly of a yellowish white or grey color and are not lobulated.

This substance is greasy to the touch, but contains small hard particles of a bony consistence, which are the result of calcification. Microscopical examination reveals beyond dispute the existence of tubercular bacilli as described by Koch. This was especially the case with the sixth cervical vertebræ. This vertebræ was filled with tubercular matter and contained six abscesses varying in diameter from 15 to 25 millimetres. One abscess existed in the transverse apophysis another extended into the trachelian prolongation of the same apophysis. A single abscess appeared in the interior of the rachidian canal, one centimetre behind the articulation of the fifth with the sixth cervical vertebræ. In all these abscesses the enveloping membrane was well defined and continuous. The seventh cervical and the three following dorsal vertebræ, present pathological conditions which did not differ essentially from those just described as existing in the sixth cervical.

The disease as developed in the subject from which the specimen was taken, presented many peculiarities rarely met with under similar circumstances, and it is safe to say that Pott's disease is very uncommon among cows. M. Remy, superintendant of the abattoir at Gand, has assured me that he has not observed an analogous case among the different animals which daily pass under his inspection, and that he has nowhere found a similar lesion described in the annals of veterinary medicine. It is an interesting fact that the tubercular disease affected but five vertebræ, of which two were cervical and three dorsal, and this establishes a near bond of similarity to Pott's disease as it occurs in the human subject.

It seems to me there can be no doubt concerning the nature of these tumors viz.: that they are the result of osseous tuberculosis. The anatomical characters presented by the contents of the cavities hollowed out in the bodies of the cervical and dorsal vertebræ, are precisely those which occur in cheesy tubercles, however, the microscopical examination which so readily revealed the presence of Koch's bacilli, seem to me to place the matter beyond dispute. As to the question why these bacilli should infest this portion of the vertebræ column, in preference we have nothing decisive to say. It is possible that the greater nervous activity which belongs to this region may account for the presence of morbid products, which generally accompany energetic vital changes, or what is more probable, the more and abundant vascularity of those parts may account for the fact, although recent investigations continue to shed increased light on this difficult question, much yet remains to explore before a satisfactory settlement can be reached. The majority of the tubercular centers were situated within the vertebræ bodies themselves, very few extending as far as the transversal apophyses. Such at least was the case in the tumor found in the sixth cervical vertebræ. Some of the abscesses were not completely surrounded with bony tissue, but penetrated the slight bony partition which separated them from the rachidian canal. Thus the tubercular center which occupied the body of the third dorsal vertebræ, opened into the corresponding costo-vertebral articulation, and an intra-rachidian tubercle existed on the superior surface of the second dorsal vertebræ. The propagation of the tubercular center along the side of the rachidian canal fully accounts for the existence of the symptoms of fatigue which the cow in question exhibited for several days before it was slaughtered, for there must have been in consequence of such an occurence, more or less pressure of the spinal cord. Had the animal continued to live, either the tubercular abscess would have emptied into the cavity of the rachidian canal, and have given rise to an irritation of the lower surface of the *dura mater*, and a consequent pachy-meningitis or else have accompanied the course of the *dura mater* with continued increase of pressure, This explanation of the development pursued by these tumors, and their relation towards the rachidian canal, fully accounts for the symptoms observed in Pott's disease of the spine, and also explains the results which have been obtained of revulsives, setons and the actual and potential cautery. This same pressure must also be regarded as the primary cause of the constrictive pains that accompany Pott's disease.

A CASE OF GASTRIC CALCULUS IN THE HORSE. By M. Remy, in the Annales et Bulletin de la Societe de Medicine de Gand.

The gastric calculus, which we have the honor of presenting, possess nearly all the characters which belong to the great variety of renal calculi observed in the horse. It has the same typical shape, being cylindrical, with the prolonged points bent in the shape of a crescent, and slightly spiral. The surface is mostly rough, as is the case with renal calculi. The convex border, however, is mostly smooth and possesses certain luminous reflection, the concave border being of a dull earthy aspect, and covered with rugosities, which present a multitude of little holes and fissures. This calculus was found in the stomach of a horse at Lille, and presents throughout three-fourths of its extent a greyish red shade, whilst the other fourth is of bluish-grey—the whole weighing 176 grammes. Gastric calculi in the horse possess a spherical shape, slightly flattened, while for the most part the surface is smooth and polished to the point of reflection, somewhat porous and slightly depressed. These calculi are composed of ammoniaco-magnesian phosphates, silicic acid, chloride of sodium, phosphate of lime, organic matter, and traces of oxide of iron. They are formed of concentric layers arranged round nucleus of foreign constitution, the latter having been conveyed into the stomach with the liquid or solid elements. These gastric calculi are rare in horses, and M. L. V. Delwart, of Cureghem, says they are so rare in monodactylous animals as to give rise to the suspicion that they do not exist among them. Such also is the testimony of other competent authorities. There exists, however, in the Veterinary School of Alfort a fragment of a gastric calculus that weighed fifty livres, but of the genuineness of this case specimen there is some doubt.

C. M. O'LEARY, M. D.

PROCEEDINGS VETERINARY MEDICAL SOCIETIES.

ONTARIO VETERINARY COLLEGE.

On March 28th, 29th, 30th and 31st, the examination of the students of the Ontario Veterinary College, for the diploma of the Agricultural and Arts Association of Ontario, took place before the official Board of Examiners; the oral and written examinations specially for honor work, having been held during the two weeks previous to the meeting of that Board.

The results of all the examinations, pass and honor, were announced at the closing exercises of the College, Temperance Hall, on the 31st of March.

The spacious lecture room was filled to the doors with students and visitors. Among those present were his Honor, Lieutenant-Governor Robinson, President Wilson of the University of Toronto Mayor Howland, John Leys, M. P. P., Charles Drury, M. P. P., G. R. R. Cockburn, M. P., Fred. Denison, M. P., Rev. G. M: Milligan, Dr. Thorburn, Dr. Duncan, Dr. Coleman of Ottawa, and others. The Lieutenant Governor, and several other gentlemen assisted in the distribution of medals and prizes. Professor Andrew Smith, F. R. C. V. S., President of the College presided. After the reading of the names of the graduates, and the presentation of prizes, Lieutenant-Governor Robinson briefly spoke, eulogizing in the highest terms, the natural ability and requirements of President Smith, and congratulated that gentlemen on the brilliant successes he had achieved in promoting the interests of the Ontario Veterinary College. How the graduates of the College had succeeded in the United States, was shown by the large number of American students who presented themselves at every session. These men had given Canada and her famous Veterinary Institution a good name abroad, and he hoped they would continue to do so.

President Wilson in briefly wishing every success to the Ontario Veterinary College and its able President, stated that, although entirely unconnected with it himself, the wide-spread reputation of the institution was constantly being impressed upon him by the letters which he often received referring to it. He considered that the possession of such a College was of immense advantage to Canada.

Mayor Howland spoke of the pleasure with which he, as Mayor of the City of Toronto, attended on this occasion. He considered that a college with three hundred and fifty students, sending out, as it was doing this year, over one hundred graduates, was a power before which quackery would soon come to an end.

Rev. G. M. Milligan, Col. Denison, M. P., W. Shaw, V. S., of Dayton, Ohio, (President of the Ontario Veterinary Medical Association), Alderman Dodds and others spoke warmly of the College, its Faculty and the graduates.

Alderman Dodds, in the course of his remarks, paid an eloquent tribute to the memory of Dr. Barrett, late Professor of Physiology in the College.

Professor Smith, President of the College, in closing, referred to the remarkable success of the past session. So greatly had the attendance increased of late, that the classes had outgrown the largest expectations of the Faculty. Before the commencement of another session, large new lecture-rooms, laboratories and every convenience for scientific work would be built.

The following is a list of the graduates:

Ernest K. Alexander, Hoosac, N. Y.; Edmund Austin, Simcoe, Ont.; Amos S. Barnes, Fingal, Ontario; Coral D. Beardsley, Union Springs, N. Y.; W. H. Beatty, James B. Black, Brampton, Ont.; John E. Blackwell, London, Ont.; J. C. Booker, Jerseyville, Ill.; James Bowler, Amherstburg, Ont,; Louis R. Brady, Manhattan, Kan.; John E. Browne, Wilmington, Ohio.; John D. Buskirk, Bradley, Mich.; Irwin J. Carter, Toledo, Ohio; W. G. Carmichael, Seaforth, Ont.; Harry D. Chamberlain, Waterloo, Ind.; Charles G. Chase, Consecon, Ont.; Eugene Coffin, Monticello, Ill.; John W. Cook, Clinton, Ont.; Samuel E. Coseford, Hollin, Ont.; James G. Clarke, Little Briton, Ont.; William F. Clarke, Goderich, Ont.; R. L. Craig, Hamilton, Ont.; James Creamer, Belmont Ont.; Marcus H. Crosby, Uxbridge, Ont.; John J. Culp, Orangeville, Ont.; J. M. Curphey, Rochester, Ind.

Hedley H. Davidson, Burlington, Ont.; Walter G. Dodds, Toronto, Ont.; G. B. Du Bois, Nicholson, Pa.; William O. Dyer, Belmont, Ont.

John S. Evans, Chesley, Ont.; Henry A. Fee, Tiverton, Ont.; Gerald J. Fitzgerald, Lucan, Ont.; Benjamin Fletcher, Oxford Mills, Ont.; Arthur G. Foot, Reading, Pa.; Harry W. Fry, Dunville, Ont.; W. J. Gardenier, Quincy Ill.; Joseph R. Grime, Blackpool, Eng.; James I. Gibson, Kemptville, Ont.; William A. Giffen, Mayfield, Ont.; Joseph R. Gillem, Belleville, Ont.; Charles R. Good, Williamsport, Pa.; Michael R. Grainger, Thamesville, Ont.; Joseph H. Goulding, Greenville, Mich.; James G. Harris, Ashburn, Ont.; Campbell S. Harston, Westminster, Md.; Donald Henderson, London, Ont.; Theries D. Hinebauch, Vicksburg, Mich.; Nicolas Hoffman, Buffalo, N. Y.; Ronald G. Holland, Wellington, Ohio; Fred B. Hollister, Montrose, Pa.; Charles E. Hollingsworth, Hillsboro, Ohio; William H. Hopkins, Green River Ont.; Ben Howes, Carlton Station, N. Y.; Ashton Hutchings, Stratford, Ont.; Sidney L. Hunter, Bath, N. Y.; Frank Hunt, Jamestown, N. Y.

Fred M. Jeffry, Tiro, Ohio; David King, Toronto, Ont.; John King, Dresden, Ont.; Thomas A. King, Brampton, Ont.; Benjamin W. Kitely, Sharon, Ont,; Henry C. Klicker, Clarence, Erie Co., N. Y.; John J. Kline, Allentown, Pa.; J. F. Lavery, Uxbridge, Ont.; Thomas W. McDermott, Le Roy, Ohio; Andrew

McFadden, Dunblain, Ont.; Aaron McKenzie, Port Perry, Ont.; Lauchlan McLean, Alliston, Ont.; James L. McMillan, Vernon River, P. E. I.; John C. McMurtry, South March, Ont.; Archie McTaggart, Nassagewaya, Ont.; James McClintock, Galva, Ill.; James D. McVicar, Poplar Hill, Ont.; George E. Morgan, Chicago, Ill.; John Moore, Plainfield, Ont.; Christopher R. Notman, Toronto, Ont.; William Nichols, Uxbridge, Ont.; Samuel Nichols, Coburg, Ont.; Oliver F. Nugent, London, Ont.; Samuel C. Orr, Riley Centre, Kan.; Levi. F. Orr, Canaan, Ohio. John P. Prudham, London, Ont.; Thomas Purvis, Mallorytown, Ont.; Richard E. Reycraft, Muirkirk, Ont.; William H. Richards, Greenville, Ohio; Harry S. Richards, Wooster, Ohio; John C. Rodgers, Ayr, Ont.; Samuel C. Rudd, Guelph, Ont.; John D. Rutherford, Lucknow, Ont.

Alexander W. Shields, Molton, Ont.; James A. Sinclair, Uxbridge, Ont.; James M. Sloan, Vicksonburg, Pa.; John Steen, Harwich, Ont.; S. S. Snider, Lawrenceville, Ohio; Owen W. Snyder, Lynnville, Pa.. James Sullivan, Almonte, Ont.; Frank Sutterby, Batavia, N. Y.; J. Q. Taylor, Marysville, Ohio; Fred. M. Tye Haysville, Ont.; John H. Veith, Waterloo, Ont. R. M. Waldron, Greensburg, Pa.; William B. Wallace, Middletown, Ohio; H. H. Ward, Rochester, Ind.; Joseph Waring, Thornbury, Ont,; John W. Waters, Fingal, Ont.; Walter F. Weese, Platville, Ill.; James Welsh, Manchester, Ont. P. C. Wilkinson, Claremont, N. H.; Charles E. Winner, Quincy, Pa.; Frank A Wiltrout, Litzenberg, Pa.; Thomas W. Watson, Marshalltown, Iowa; T W. Walton, Warren, Ill.; W. C. Young, Bristol Corners, Que.

Prize and Honor List.—Seniors:

Pathology.—Silver Medal, J. C. Booker. Second Prize, R. M. Waldron. Third Prize, J. E. Blackwell, C. E. Winner, equal.

Anatomy.—Silver Medal, J. E. Blackwell. Second Prize, R. M. Waldron. Third Prize, H. Fee.

Entozoa.—First Prize, F. N. Tye.

Materia Medica.—First Prize, J. E. Blackwell. Second Prize, E. Coffin. Third Prize, J. J. Klein, R. M. Waldron, equal.

Physiology.—Silver Medal, J. Rutherford. Second Prize, J. E. Blackwell. Third Prize, H. Fee.

Chemistry.—First Prize, J. Moore. Second Prize, T. D. Hinebauch. Third Prize, J. G, Harris.

Microscopy.—First Prize, C. E. Winner, H. W. Fry, J. Rutherford, equal.

Bacteriology.—First Prize, B. Johnson, C. E. Winner, equal. Second Prize, J. E. Blackwell, L. R. Brady, D. King, equal. Third Prize, H. D. Chamberlin, W. T. Weese, equal.

For the Best General Examination.—Gold Medal given by the Ontario Veterinary Medical Association. Awarded to J. E. Blackwell, London, Ont.

Juniors:

Anatomy.—Silver Medal, W. E. Russell. Second Prize, W. Buiger. Third Prize, E. D. McQueen, S. J. Robinson, equal.

Chemistry.—First Prize, T. H. Smythe.

Physiology.—First Prize, J. J. Coutts. Second Prize, A. G. Wicks.

Pathology.—First R. L. Jamieson. Second Prize, C. D. Morris. Third Prize, W. H. Lindsay, J. D. McGregor, W. E. Russell, N. H. Allis, equal.

CHICAGO VETERINARY COLLEGE.

The fourth annual commencement exercises of the Chicago Veterinary College were held March thirty-first in the new college building, Nos. 2357 and 2359 State street. The President's address was a review of the foundation, growth and requirements of the institution. The whole number of matriculants was fifty-three. The graduating class consisted of the following twenty-six members: E. M. Heath, of Massachusetts; J. D. Robinson, of Ontario; E. L. Kennedy, of Michigan; D. R. Moysey, of Ohio; A. W. Dreier, of Wisconsin; J. M. Phillips, of Illinois; G. R. Young, of Nebraska; E. R. Voorhees, of New Jersey; T. G. Sabin, Massachusetts; S. S. Snyder, Ohio; Chas. W. Johnson, Illinois; J. H. Wattles, Wisconsin; J. T. Clark, Iowa; F. N. Rowan, Illinois; Gilbert Hess, M. D., Ohio; F. T. Eisenman, Kentucky; W. S. Brayton, Illinois; D. R. Price, Wisconsin; H. H. Tarr, New York; A. Cooley, Ohio; R. C. Moore, Kansas; L. S. Pocock, Colorado; A. G. Bernard, Illinois; F. G. Harbour, Illinois; L. F. Brown, Dakota; G. H. Smith, Illinois. After the conferring of the degree of Doctor of Veterinary Science on the graduates by the President, an able valedictory was read by Dr. Chas. W. Johnson.

He dwelt on the trials and difficulties of the student, comparing the pains of the past, with the pleasures of the present moment of success in holding the diploma which entitled them to the honors and dignities of Veterinary Surgeon.

He pictured to the minds of his fellow graduates, the vast field which their adopted profession opened before them, of labor and struggles, of success and fame. He pointed out the deficiencies of its literature, and their obligations to correct them, the low standing of most of its members, and the means of raising it. He urged them to systematize their work and never to lag in the road of progress, but push on with a surety of a brilliant harvest. He appealed to them to remember always their Alma Mater with pride, and their professors with gratitude.

Dr. E. M. Reading, Professor of Physiology, delivered the doctorate address, in which he demonstrated the close relationship which exists between Human and Veterinary Medicine. "Human Physiology," he says, "is based largely upon the study of animals, while Animal Chemistry applies equally to them as to man." He showed how the same might be said, with a little modification, of the other branches, and saw no good reason why a Veterinarian should not be a good Human Physician, and *vice versa.*

The Doctor dwelt on the fact that Veterinary Science is less highly esteemed than its sister profession; that the latter has been thousands of years in its growth, while the former has occupied only a century in reaching its present standing, and said: "Age always inspires veneration, apart from a consideration of real merit. The science of Astronomy, which certainly dates back to the building of the pyramids, we regard with wonder, while chemistry can show a history of only two hundred or three hundred years, yet the latter science is far more serviceable to mankind. In like manner, Veterinary Medicine lacks age, and consequently inspires less reverence than its sister profession, but without reason, as we should esteem all human institutions for what they are, rather than what they have been."

Attention was called to the number of ignorant "horse doctors," but this fact was shown to be no more proof of the low character in the Veterinary profession, than that the number of quacks in the human profession, was also a mark of its discredit. Again, the Veterinarian has a greater field for investigation, as his efforts tend to make the science of medicine more exact through experimental means. He has the advantage also, in that he need not hesitate to sacrifice life, in order to demonstrate a scientific truth, or evolve a new law.

Apropos of the necessity of high mental qualities in the Veterinarian he said :—"Thus do I say that in the Veterinary branch of Medicine, where the field for investigation is practically unlimited, we need men of learning and high mental endowments, men, whose discrimination is exact, whose perception is clear, whose logic is sound and whose conclusions are well-founded.

"If Science is ennobling, if it develops culture and refinement, then ought the learned Veterinarian be honored among men.

"This institution, just turning four years of age, is rapidly gaining the good reputation that it so well deserves. This year's graduating class may well be proud of their Alma Mater, and the Faculty have good reason to expect more than average success from this class, for a more intelligent, studious lot of gentlemen never went out of any college. As an evidence of this fact, and of the ability of the Faculty to impart their knowledge to others, we may point to the fact that fourteen out of the twenty-six graduated, passed with honors."

The advantages possessed by the Chicago Veterinary College, are many. The new building, 50x146 feet is located on the principal street in the city, has a reception room, private offices for the officers of the corporation, pharmacy, carriage floor, bath-room for patients, store-room for slings, hobbles, etc., a large hospital, well lighted and ventilated, with commodious box stalls, and a large operating-room on the ground floor. The lecture hall, dissecting room, museum, dog kennels and feed-room, are on the second floor.

The hospital is sufficiently appreciated by the public to keep it full all the time. The senior students are appointed to dresserships and pharmacy work during the session, which familiarizes them with the practical application of the theory taught in the lectures. They are allowed also to assist at operations. The existence of contagious pleuro-pneumonia in Chicago last fall gave an opportunity for the students to get clinical lectures on the disease, and to make examinations ante mortem and post mortem in all stages and forms of the disease.

GRADUATES OF THE VETERINARY DEPARTMENT, UNIVERSITY OF PENNSYLVANIA.

At the 131st annual commencement of the University of Pennsylvania, and the first of the Veterinary Department, held in the Academy of Music, Philadelphia, June 8th, 1887, the degree of *Veterinariæ Medicinæ Doctor* was conferred on the following gentlemen, in order of merit as named:

Richard W. Hickman, Bustleton, Pennsylvania,
Simon Harger, Hecktown, Penn.,
Hiram P. Eves, Lima, Penn.,
Charles Williams, Fellowship, New Jersey,
Charles Lintz, Holmesburg, Penn.,
Edgar Marlin, Philadelphia, Pennsylvania,
John F. Vandegrift, Langhorne, Pennsylvania,
William B. Montgomery, Chestnut Hill, Penn.,
Richard G. Webster, Media, Penn.,
Charles Cullen, Philadelphia, Pennsylvania.

GRADUATES OF THE VETERINARY DEPARTMENT OF HARVARD UNIVERSITY.

At the commencement exercises of Harvard University, held at Cambridge, Mass., on June 29, 1887, the following gentlemen received the degree of *Medicinæ Doctor Veterinariæ*:

Francis Boyd Carleton, Salem, Massachusetts,
Edwin James Castle, Mithuen, Massachusetts,
Daniel Emerson (Ph. G.), Boston, Massachusetts,
William Alvan Hitchcock, Madden, Massachusetts,
Emmet Walter Roche, West Roxbury, Mass.,
Ernest Charles Schroder, Baltimore, Maryland,
Harrison Whitney, (A.B.), Harrison, Maine.

OBITUARY.

MICHAEL BARRETT, M. A. M. D.

Dr. Barrett, so well known to many readers of this Journal, was born in London, England, in 1816, consequently, had attained the ripe age of 71 years at his death, which took place in the spring of 1887.

In regard to his early life nothing is known that would indicate he had any special fondness for those departments of science in which he so excelled, after his powers had fully developed. The son of a barrister, he seemed to turn with distaste from the law office, and delighted himself with the ships which crowded the river Thames. So fond was he of sailing, that he was sent out as a sailor, in which capacity he spent two years of his life. His father, however, determined to remove to Canada, and the subject of this sketch accompanied him as far as Toronto. Here, however, a separation soon took place, the father taking his family to Natchez, Miss., where they ultimately settled. Young Barrett remained in Canada. Shortly after he had arrived here, the struggle known as the rebellion of 1837 took place. Michael Barrett joined the forces which were fighting against the insurgents, but was not, as far as known, called to take any active part in the contest.

During the year 1837 or 1838 his marriage took place—a marriage which proved an eminently happy one.

In 1845 he became connected with Upper Canada College. He had not, at this time studied medicine, or taken any degree in arts. In 1849 he became Master of Arts, graduating from Toronto University. During the ensuing years he studied medicine, and such remarkable ability did he display as a student, that, on the completion of his course in 1852, he was appointed Lecturer in Chemistry in Toronto School of Medicine. He was now 36 years of age, and after holding the chair of chemistry a few years, he was appointed to that of Physiology. This appointment he held with distinguished success up till the day of his death. In 1870 he was selected as lecturer on Animal Physiology in the Ontario Veterinary College; this chair he also held at the moment of his decease.

In 1880 and '81 a severe illness so prostrated Dr. Barrett that he was unable to fulfil his arduous duties. At this time he was holding positions in Upper Canada College, Toronto School of Medicine and the Ontario Veterinary College. He resigned his chair in Upper Canada College, but in the other two institutions, so great was the anxiety to retain his services, that the place was temporarily filled, in the hope he might be able to resume the duties after a period of rest. Fortunately, this expectation was realized, and the following session to the delight of the students, he appeared in his accustomed place. He had now reached the ripe age of 66, an age at which most men seek to retire. But Dr. Barrett was an enthusiast in medical education, and, seeing the need in Toronto of a Woman's Medical College, he, in 1883, suceeded in establishing the present prosperous institution of that name, holding the position in it of Dean of the Faculty and Professor of Physiology.

With the buoyancy of youth did this distinguished physiologist fulfil his duties which were so heavy that they would have overtaxed the energy of many a young man—till the year before his death. In 1886 Mrs. Barrett was taken from him, and he never recovered from this crushing blow. The partner of his joys and sorrows for close on fifty years, he had so loved her that it seemed impossible to live without her, But, although the joy had gone out of his life, he bravely bore up to the last. On the Friday before his death, he lectured at Toronto School of Medicine, and at the Ladies' College. On Saturday morning he lectured at the Veterinary College. At one o'clock he took lunch with his family, at half-past two he was found dead in his drawing-room.

Dr. Barrett was connected with Upper Canada College for more than thirty years, with the Toronto School of Medicine for thirty-five years, with the Veterinary College sixteen, and with the Womans' Medical College for four years. Most of the legal and medical men of Canada, and very many of those of the United States, were thus under his professional care. But it is especially of his connection with the Veterinary College that we wish to speak. Out of the one thousand students who have attended this college up to the present time, more than eight hundred have come directly under Dr. Barrett's instruction, as Professor of Physiology. The influence he has thus had it is impossible to estimate. While a student in the college in 1870–71 the present writer first listened to his lectures. The charm of these lectures made an ineffaceable impression on the mind. Afterward associated with him on the teaching staff, it was impossible not to admire him the more, as acquaintance ripened into friendship. As a lecturer, the eloquence and clearness of his style, together with his remarkable geniality of manner, made him the idol of the students of all the colleges. But especially did he appreciate, and was appreciated by the veterinary students. Often has he expressed the pleasure which he experienced in lecturing to them. And by many tangible proofs did the students show their affection for him. On the day of the funeral such a concourse of students as perhaps never before, in this city at least, showed their love for a deceased professor, sadly followed his remains to their resting place—thus honoring themselves as well as the well-loved memory of the lamented Dr. Michael Barrett.

J. T. D.

REVIEWS.

The Archives of Veterinary Science, published by the Medical Department of the Ministry of the Interior St. Petersburg, Russia.

The February number of the above mentioned review, now before us, constitutes the first issue in the present year of the bi-monthly publication of extensive veterinary records, being conducted under the auspices of the St. Petersburg Ministry of the Interior for the last seventeen years, the subscription price for the publication being five roubles for the Government Veterinary Surgeons and students, and seven roubles for the ordinary public.

This publication is the official organ of the Russian Ministry of the Interior, rendered necessary for the promulgation of Government rules concerning veterinary supervision to be enforced throughout the empire, the transportation of cattle within the limits of the country, the killing off and disposal of the bodies of animals succumbing to epizootic diseases, as well as for the publication of the last veterinary police measures adopted at the last deliberation of the Veterinary Surgeons in the principal cities of the empire and approved by the Ministry of the Interior. Those measures are always communicated officially by the Ministry of the Interior to all Governors of the Provinces—or, as they are called "governments" of Russia— who have to enforce their adoption in their parts of the country, while the insertion of the test of the same measures in the "Veterinary Archives" brings the same to the notice of all people interested in the subject throughout the Empire. The "Veterinary Archives" present also the lists of most recent promotions among the Veterinary Surgeons of Russia, as well as the reports concerning the government Institutes of Veterinary Science in the two capitals and the largest cities of the Empire, such as Kharkov, Kazan, Dorpat, Warsaw, Odessa, etc.

Part I. The official part of the magazine is given up entirely to official communications concerning the latest Veterinary police measures, the spreading or localization of epizootic diseases, changes in the Veterinary Department of the Ministry, etc.

Part II. *Biological: Professor E. K. Brandt* on the "Animal parasites of domestic mammalians and birds." (Illustrated.)

Part III. *Pathologo-therapeutic and surgical. Professor G. Poluta*, paper on "Physiological effect of laxative mineral drugs."

Professor V. E. Vorontzov on the report of Prof. Williams and Prof. Roberts in the British National Veterinary Society.

Popoff, *V. S.* on "Inflammatory prolobi in ducks."

A. Gryshin, *V. S.* on "Epidemic abortions among cows, attributable to their feeding on moulded oat-straw."

PART IV. *Hygenic and Rural Economic. P. M. Medvedsky*, "Horse breeding in Russia."

K. T. Kalning, "The growth of the hoof and its acceleration by irritating applications."

A. T. Jacobson and M. A. Ignatief, "A project of measures for the prevention of contamination with the Siberian plague of men working on animal products in factories, etc."

PART V. *Veterinary Police and Judiciary. Prof. E. M. Zemmer*, "Symptomatic carbuncle in horses." (Illustrated.)

A. N. Trussof, "Law of June 3d, 1879, in the government of Kaluga. Deliberations on the introduction of that law in the Southern governments."

PART VI. *Bibliographical.* Protocols of the sittings of the Society of Veterinary Surgeons in St. Petersburg.

V. G. Tatarsky, "The activity of the S. V. S. in Moscow in 1885 and 1886. Scientific reports of the Veterinary Institute of Kazan."

PART VII. *Miscellaneous.* Containing reviews of the foreign medical periodicals and books.

A TREATISE ON DIPHTHERIA. Historically and Practically Considered, including Croup, Tracheotomy and Intubation. By A. Same, Docteur en Medicine, etc., etc. Paris. Translated, Annotated and the Surgical Anatomy added. Illustrated with a full page colored lithograph, and many wood engravings. By Henry Z. Gill, A. M., M. D., LL. D. Cleveland, Ohio. Price (cloth) $5.00. St. Louis, Mo., J. H. Chambers & Co., 1887.

The above is the title of an extremely valuable, sensible, and interesting work on that much dreaded disease diphtheria, which has just issued from the press of Messrs. J. H. Chambers & Co., of St. Louis, Mo. As the able translator, Dr. Gill has so aptly said: "The book grows in interest, until it becomes a charm." Dr. Same has treated his subject in a masterly and exhaustive manner, beginning far back in its earliest history, and tracing it down to the present day. He discusses in a clear and able fashion, the many theories that have attached themselves to diphtheria, and as would be expected, he disposes of most of them as useless, empirical, and not proven. In this we regard him as eminently sound. He clears away the rubbish of his subject, and presents the digested facts, in a plain, convincing and simple manner. We heartily agree with him when he says that diphtheria, "Is a disease unique, and specific," that it is contagious, and is a *constitutional* disease, the pharyngeal diphtheric membrane, being only a local expression of a general malady. He lays proper stress upon local treatment selecting such remedies only as experience has proved to be useful, and dismisses with a few sensible words, the great host of drugs that have been recommended by the inexperienced, and that encumber our literature, Constitutional treatment justly holds a high place in his estimation. Appreciating the severe depression that comes on so early in diphtheria, he advocates supporting measures, and gives to alcohol the prominence it really deserves. His ideas on these points are very clear, and very ably and forcibly set forth. The subject of Tracheotomy occupies a considerable space in this work, and here again, Dr. Same stands upon sensible and rational, as well as scientific ground. Before this desperate and dangerous expedient is resorted to, he asks us to consider well, all the grave factors in the problem, and while it is an established surgical procedure, and sometimes imperatively needed, yet in the majority of cases, it is of doubtful utility, and its sequelæ are so numerous and severe, that we are rarely justified in its performance. The work is rich in statistics and records of cases, and is a valuable contribution to the literature of this terrible disease.

The chapter on the Surgical Anatomy of the Pre-Tracheal Region, with special reference to Tracheotomy in children is of great value as clearly illustrating the anomilies of the vessels and nerves of that important anatomical region. The materials for this chapter have been freely taken from the works of Dr. L. S. Pilcher of Brooklyn, N. Y. The publishers have spared no pains in making the book an attractive volume, and the medical profession may congratulate itself that so clear and able a work has been added to its literature.

H. W. M.

The Proceedings of the Linnean Society of New South Wales.

(Second Series.) Vol. I. Part IV. for the year 1886. Sidney, 1887.

This volume of nearly 300 pages, contains the papers, twenty-three in number, read in the last three months of 1886, and the address of the President, Prof. W. J. Stephens, M. A., F. G. S., at the Annual General Meeting. It is a good indication of the interest taken by our Antarctic friends in the Sciences, and especially in Natural History.

In the *Mammalia* a new species of *Hapalotis* from N. W. Australia is described.

In *Reptilia* a new fresh water Tortoise, *Carettochelys inscueptus* and two new species of Geckos, *Nephurus levis* and *Diplodactylus toniconda* are described.

The President in his address dwelt on the importance of making the study of Natural History as an essential part of general education. He deplored the fact that Science was not pursued for the sake of Science in the educational establishments of the country at large. He says, he is convinced that such a pursuit is natural and lawful and even, to some extent, obligatory upon civilized men, and that it fails to be recognized in that light entirely on account of a pedantic, irrational and unnatural system of public education. Compared with Physical Science, how much easier its study. No artificial apparatus is necessary; we are always in the Laboratory. The most tremendous yet, to us the most trivial phenomena are incessantly appealing to our senses and our intellect, and it is only our schooling that renders us apathetic, blind and deaf, and dead to their challenge, W. A. C.

OXYGEN IN THERAPEUTICS, by C. E. Ehinger, M. D. Cloth, 12 mo., pp. 156. Chicago, W. A. Chatterton & Co., 1887.

Just now, there is a good deal of therapeutic oxygen in the air. Perhaps there is no single element which has been so variously, and for the most part, quackishly advertised. Literally, millions of bottles of some sort of solution, which probably contained about the usual proportion of combined oxygen—*aqua impura*, for instance—have been sold at a verv exorbitant price during the past ten years, and the leading journals and magazines, daily, weekly and monthly, exalt the virtues of oxygen, until intelligent people have become fairly disgusted. The very word oxygen, has, to many physicians, come to be almost synonymous with quackery. Nevertheless, oxygen has a field as legitimate as that of any other agent or element.

Dr. Ehinger has not attempted an original work, and does not claim to have been a pioneer in this field. He is rather a compiler of the more recent labors of others who have been too timid or too busy to place themselves on record in any more permanent form than fugitive papers in the medical journals. The book is a modest and practical work, and will be an aid to those who would learn what has been done by a legitimate use of oxygen and allied gases, used as remedial agents.

It would be strange, if such a work should be free from errors. There are some crude chemical statements, some evidently typographical blunders, but it is suggestive of the possibilities of the oxygen group, when it shall be systematically studied by those, whose sole object is not the harvest of dollars that jingle in the pockets of successful charlatans. It will throw some light on a subject hitherto, and still not well understood.

BOOKS AND PAMPHLETS RECEIVED.

JAHRESBERICHT DER K. CENTRAL-THIERARZNEI-SCHULE IN MUNCHEN 1885-86. Leipzig, 1887.

CHICAGO VETERINARY COLLEGE. Prospectus for Session 1887-88.

ANNUAL ANNOUNCEMENT OF THE NEW YORK COLLEGE OF VETERINARY SURGEONS AND SCHOOL OF COMPARATIVE MEDICINE, 1887-88.

JOHNS HOPKINS UNIVERSITY CIRCULARS. Baltimore.

THE JOHNS HOPKINS UNIVERSITY REGISTER, 1886-87.

THE CORNELL REGISTER, 1886-87. Ithica, N. Y.

ANNUAL ANNOUNCEMENT OF THE LONG ISLAND COLLEGE HOSPITAL. Brooklyn, N. Y., 1887.

ANNUAL REPORT OF THE BOARD OF MANAGERS OF THE NORTH-EASTERN DISPENSARY IN THE CITY OF NEW YORK. 1887.

PERSISTENT PAIN AFTER ABDOMINAL SECTION. By James B. Hunter, M. D. (Reprint from Gynecological Transactions, 1886.)

THE PAST, PRESENT AND FUTURE TREATMENT OF HOMŒOPATHY ELECTICISM AND KINDRED DELUSIONS. By Henry I. Bowditch, M.D., Boston, 1887.

REPORT OF THE COUNCIL OF THE ZOOLOGICAL SOCIETY OF LONDON FOR THE YEAR 1886.

ANNUAL REPORT OF THE AMERICAN MUSEUM OF NATURAL HISTORY FOR THE YEAR 1886-87.

ANNUAL REPORT OF THE BOARD OF REGENTS OF THE SMITHSONIAN INSTITUTION. PART I. Washington, 1886.

CONTRIBUTIONS TO THE ANATOMY OF GEOCOCCYX CALIFORNIANUS AND ADDITIONAL NOTES UPON THE ANATOMY OF THE TROCHILI, CAPRIMULGI AND CYPSELIDÆ. By R. W. Shufeldt, M. D., C. M. Z. S. (Reprint from the Proceedings of the London Zoological Society, 1887.)

CAPTAIN GLAZIER AND HIS LAKE. An inquiry into the history and progress at the head waters of the Mississippi. Ivison, Blakeman & Co., New York.

The following foreign publications are to hand :

The Veterinarian, June, 1887. The Veterinary Journal, June, 1887. The Quarterly Journal of Veterinary Science in India, April, 1887. Gaceta Medico-Veterinaria, June, 1887. La Cronica Medica, May, 1887. Giornale di Anatomia Fisiologia e Patologia degli Animali, April, 1887. Medico Veterinario, April, 1887. Bollettino Scientifico, March, 1887. La Clinica Veterinaria, June, 1887. Le Progress Medical, June, 1887. Annals et Bulletin Societie de Medicine de Gand, June, 1887. Revue Veterinaire, June, 1887. Der Zologische Garten, March, 1887. Wochenscrift fur Thierheilkunde und Viehzucht, May, 1887. Schweizer-Archiv fur Thierheilkunde, June, 1887. Archiv fur Wissenschaftliche und Praktische Thierheilkunde Band 13, Heft 3. Monatsschrift des Vereines der Theirarzte in Oesterreich, June, 1887. Tidskrift fur Veterinar-Medicin och Husdjurss-Kotsel, April, 1887. Bladen uitgegeven door de Vereeniging tot Bevordering van Veeartsenijkunde in Nederlandsch-Indie Deel 11, Afl 1. The Archives of Veterinary Science, St. Petersburg, June, 1887.

PROGRESS OF VETERINARY SCIENCE.

Whooping-Cough in a Cat.—In the British *Med. Jour.*, May 7, 1887, Mr. O. Bowen, of Liverpool, says: "For the past few weeks I have had under my care a little boy suffering from a more than usually severe attack of whooping-cough, and his mother informs me that for quite a fortnight their cat has had five or six distinct fits of coughing daily, similar in every respect to the boy's, which end after the expectoration of frothy mucus. The cat between the attacks is tolerably bright and active, though not so lively as she formerly was, and has considerably fallen away in condition. This is the first instance of a domestic animal becoming affected through, apparently, infection from a human being, which I can remember having observed, and it occurred to me that the fact may be of interest to others."

Bacteriology.—Among matters of special interest to those interested in Comparative Pathology were the lectures given this Spring by Professor Ramsey Wright, of University College. The course consisted of five lectures, which were delivered specially to veterinary students in the Ontario Veterinary College, but which were attended by medical men and veterinarians from different parts of the provinces. Professor Wright, who is a master of the subject—recognized as one of the best authorities on the continent in this department, gave a clear account of the various micro-organisms, with methods of cultivation. Practical demonstrations of "cultures" were given. The more important diseases produced by these organisms were touched upon more or less fully. The importance of the subject is so great, especially from the standpoint of comparative medicine, that no effort to advance it can be considered as superfluous.

The Cow as a Source of Scarlet Fever.—Unquestionably there is much to be gained by studying any possible connection there may be between man's diseases and those of his brute companions. Such a course has been pursued in and about New York at times during the past few years, especially with reference to scarlet fever, but the public statements made by those who have prosecuted the inquiries do not seem to have excited quite so much attention as might have been expected. Toward the close of the year 1885, Dr. E. Klein, of London, undertook a bacteriological investigation in this direction, and he gives an account of his observations in a paper contributed to the "Proceedings of the Royal Society," vol. xlii, No. 253, containing among others, the proceedings of the meeting of March 3, 1887. Dr. Klein satisfied himself of the morphological identity of a micrococcus found in the blood of human scarlet-fever patients with that obtained and cultivated from certain cows affected with a similar disease. He also inoculated eight calves with cultivations of the micrococcus of scarlet fever in the human subject, and in all of them a disease was developed that seemed identical, as to both the cutaneous and the visceral lesions, with an affection produced in other calves by inoculation from the cows in question. Dr. Klein thinks it is evident from these observations that the danger of scarlatinal infection from the disease in the cow is real, and that toward the study and careful supervision of this bovine disease all efforts ought to be directed, in order to check the spread of scarlet fever in man, as well as in the interests of agriculturists.—*N. Y. Medical Journal.*

EARTH-WORMS AS CARRIERS OF ANTHRAX-POISON. (VON BOLLINGER).—Robert Koch, in a series of experiments, proved Pasteur to be mistaken in his theory that earth-worms, together with the soil adhering to them, took up the spores of anthrax and brought them to the surface of the earth. One of his experiments consisted in infecting a number of mice with these worms finely rubbed up, whereupon it was found that only one of the animals died of anthrax. Fely, who had performed a number of similar experiments, found that guinea pigs died of anthrax after having been infected with particles of dried earth-worms. Bollinger experimented upon twenty squirrels, white rats and guinea pigs, using 72 worms from the most celebrated anthrax districts of the Bavarian Alps, which he rubbed up, each separately, in sterilized water. Among 21 worms one only was found to produce anthrax, from which he naturally concluded that 5 per cent. of earth-worms contain anthrax poison. Johne, however, draws a different conclusion from Bollinger's experiments, which would go to show that out of 72 only one worm contained anthrax poison. This would also substantiate Koch's view that earth-worms are very poor carriers of anthrax.—*Weekly Medical Review.*

ACTINOMYCOSIS IN MAN.—Up to now 75 authentic cases of actinomycosis hominis have been observed. In regard to the etiology, Moosbrugger supposes that with man, as well as animals, the cause can be traced back to the consumption of grain, such as barley, or the inhalation of the specific germs into the respiratory passages. A direct inoculation of the disease from the animal upon man, or infection by eating sick meat, although not impossible, appears rather improbable. Suppuration, although frequently present, is not always necessary, and generally only found in older cases. The prognosis depends upon the seat of the disease, deep affections, where operative interference is impossible, being the more serious.—*Weekly Medical Review.*

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ORIGINAL COMMUNICATIONS.

ART. XXVIII. TERATOMATA. AN ÆTIOLOGICAL STUDY.

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The term *teratomata* in its most extended sense may be applied to those very remarkable congenital tumours which have always excited the interest of pathologists, not only from the variety of the tissues which enter into their composition, but from the most unexpected situations in which they occur. They may consist simply of skin possessing a few hairs and sebaceous glands, or they may contain in addition, bone, cartilage, muscle, fat, and even nerves. Although they exhibit a great tendency to occur in certain organs and regions of the body more frequently than others, nevertheless they enjoy a wide distribution.

The object of the present essay is to attempt a classification of this confessedly heterogeneous group by a careful consideration of their ætiology. The method adopted is to define the various classes and describe typical specimens in each class. For this purpose, although free use will be made of recorded cases, especial attention will be given to examples of those tumours I have personally dissected, or have had full opportunities of examining in museums or at the various London societies. This restriction of material is of pressing importance, for embryological and morphological researches have, during the last twenty years, brought to light many facts which will be freely utilized in the present study. As these facts were unknown to pathologists such as Morgagni, Lebert and Cruveilhier, the cases recorded by them cease to have much value, for the details in most instances are deficient in just those particulars which for the requirements of modern pathological anatomy would be of greatest value.

The cases recorded by these pathologists possess an interest, and are in a certain way important, inasmuch as they enable us to form tables whereby we may draw conclusions as to the relative frequency with which certain organs or regions of the body present such tumours.

We must now consider the definitions :—

Teratomata constitute a class of congenital tumours composed of formed tissues derived from the epiblast and mesoblast, or from epi-meso and hypoblast.

They form three groups, distinct not only in structural character but also in their ætiology :—

1. Dermoid cysts, arising from sequestrated portions of the epiblast.

2. Dermoid cysts and tumours arising in obsolete canals.

3. Parasitic fœtuses.

Before proceeding to deal with each group separately, it will be advisable to describe a typical example of each, as well as extreme forms in each division.

(1.) *Dermoid Cysts.*—The best examples of this group occur at the outer angle, less frequently at the inner angle of the orbit and at the root of the nose. The general appearance of a cyst at the outer angle is too well known to require a figure, but a drawing of the rarer variety is shown in Fig. 1. On opening such a cyst its interior will be found lined with skin; sprouting from the interior are hairs, many of which lie loose in the cavity mingled with epithelial scales, cholesterin and sebum, the latter being a product of the sebaceous glands which beset its walls. The hairs may resemble lanugo or the coarser hairs characteristic of the adult. Often the shed hair may be rolled up into balls as in fig. 2.

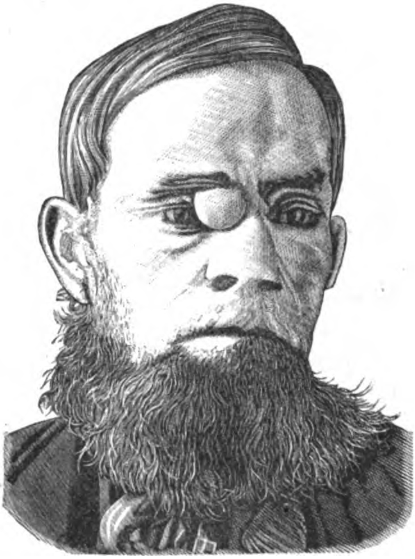
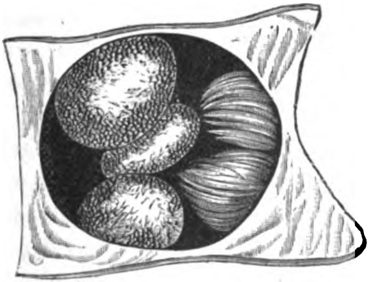


Fig. 1. A dermoid cyst at the inner angle of the orbit.



ig. 2. Dermoid Cyst from the back of a cow. (Museum Royal College of Surgeons.)

The hairs in a dermoid cyst may be two or three fine downy stems or innumerable. In length they are quite as variable, measuring in some cases a few lines, in others two feet. The colour is equally capricious and bears no relation to that on the body of the individual. In one reported case of a dermoid cyst occurring on the mesentery of a negress, blonde hairs were found. Different coloured hairs may be found in the same cyst, and a hair may be blonde at one extremity and black at the other. The colour of the hair changes with age. In animals the cyst will contain hair or wool according to the nature of the animal, and if in birds, feathers will be found.* In the majority of cases dermoid cysts are simple, but multilocular cysts occur with tolerable frequency. The most complex forms are found in the ovary.

Thus a dermoid cyst may be defined as a cavity lined by skin, furnished with dermal appendages, such as sudoriparous glands, hair with sebaceous glands, and in some situations, more especially the ovary, bone and teeth. No cyst can be termed dermoid unless it contains skin. On the other hand, all cysts containing skin are not necessarily dermoids, e. g., parasitic fœtuses. It is rare for "sequestration" cysts to possess teeth. These are usually found in those originating in obsolete canals, but are not confined to them.

Sudoriparous glands are not by any means always present in the walls of dermoid cysts, but occasionally they are present in vast quantities. In rare cases, examples of which will be referred to later, branched sebaceous glands are found, and in rarer instances a mammary gland. Commonly the skin lining the cyst wall differs from ordinary skin in having no horny layer.

(2). *Dermoids originating in obsolete canals.* This group includes those cysts which, like the preceding, are lined with skin, furnished with hairs and sebaceous glands. They may also contain teeth. Some dermoids belonging to this group may present themselves as tumours, the skin elements forming a capsule to the tumour, instead of forming the boundary walls of a cavity. The two forms agree in that they originate in obsolete canals.

We may select for our type lingual dermoids, often mistaken for ranulæ, but frequently described as sebaceous cysts of the tongue. Dermoid cysts of the tongue are retention cysts and arise in connection with the lingual duct, first described by His. This duct is represented in Fig 3. It is present in about ten per cent. of all human tongues examined. It runs from the foramen cæcum on the dorsum of the tongue to the posterior surface of the hyoid bone, where it ends blindly. In the ordinary course of events the duct should suffer obliteration. Occasionally its position is indicated by an impervious fibrous cord. Should the extremities of this duct suffer obliteration and the intermediate part persist, the slow accumulation of epithelium and sebum distend it into a cyst. For a fuller discussion of the relation of this duct to lingual cysts, and also the connection of lingual dermoids situated between the anglo hyoid and genio-hyoglossus muscle, I would refer the reader to the reference given below*

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*Lebert refers briefly to some examples of this nature.

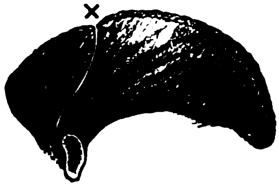

Fig. 3. A longitudinal section through a human tongue, showing the lingual duct.

Dermoid cysts growing in the latter situation originate in abstricted portions of the branchial cleft usually known as the hyomandibular ; they differ from cysts, originating the lingual duct only in the matter of situation, and like them are often confounded under the misleading clinical term, ranula. For dermoids arising in other situations of the neck from branchial spaces, see page 304.

In Fig. 4 is represented a rare form, known as a dermoid tumour. Tumours of this nature are solid and pedunculated. The exterior is covered with skin, from which hair grows, often many inches in length. The interior is made up of connective tissue, fœtal cartilage, fat, and sometimes nerve tissue. The most common seat for such tumours is the rectum. This form may possibly arise in the neurenteric canal, a passage whose nature and relation to dermoids will be fully discussed later.

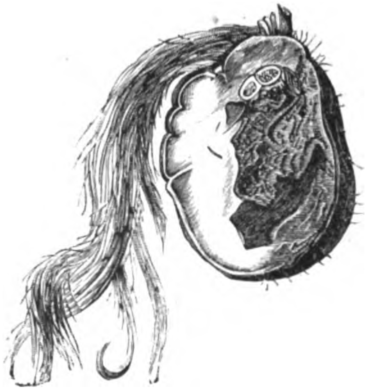

Fig. 4. A dermoid tumour from the Rectum. (After Dr. Port.)

3. *Parasitic Fœtuses.*—The last group comprises those

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*Ranulæ and Cysts in connection with the Hyoid bone. Path. Soc. Trans., Vol. XXXVIII., 1887.

extraordinary conditions known as parasitic fœtuses. They may vary from two fœtuses attached to each other by a narrow band, or they may be fused throughout the whole length of the trunk as in the amphibians in Fig. 5. The parasitic part may be simply a limb as in Fig. 6, or a shapeless mass growing from the sacrum, Fig. 7. In all these cases the deformity results from two fœtuses being developed from a single ovum. If both go on to full development a double monster is produced. If one part undergoes suppression, it simply becomes a shapeless, confused mass. This is known as the parasitic fœtus in contradistinction to the autosite or mature fœtus to which it is attached. In a case reported by Treves[*] as a congenital coccygeal tumour, the abnormal mass was found to be composed of skin possessing hair with developing sebaceous and sweat glands, masses of fat, cysts filled with mucoid material, portions of intestines, and bone covered with cartilage. Standing out from the growth were five nipple-like processes of flabby, hairless skin that resembled rudimentary digits. The largest of these exhibited vigorous contractile movements that were increased by stimulation with cold. Faint movements could, under certain conditions, be induced in the smaller processes. The mass was removed during life, and was found to be attached to the posterior surface of

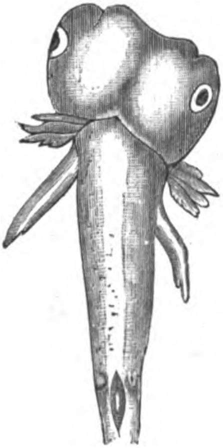

Fig. 5. Two amphibians observed to be developed from one ovum. (Clark.)[†]

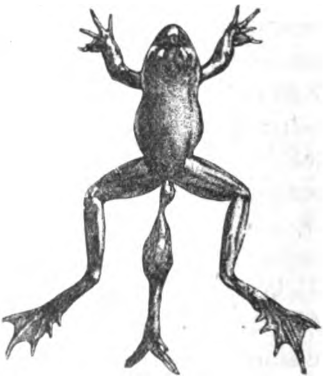

Fig. 6. A parasitic embryo represented only by limbs. (After Tuckermann.)[‡]

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[*] Path. Soc. Trans., Vol. XXXIII., p. 285.
[†] Anniversary Memoirs, Boston Soc. Nat. Hist., 1880.
[‡] Journal of Anat. and Physiology, Vol. XX., p. 576.

the coccyx and the lower half of the sacrum. Fig. 7.

Although parasitic fœtuses occur with greater frequency in the neighborhood of the sacrum than elsewhere, nevertheless they are by no means uncommon in other situations. The admirable Teratological collection in the museum of the Royal College of Surgeons possesses some excellent and remarkable specimens illustrative of the condition in such situations as the cranium, jaws, thorax, abdomen and the like.

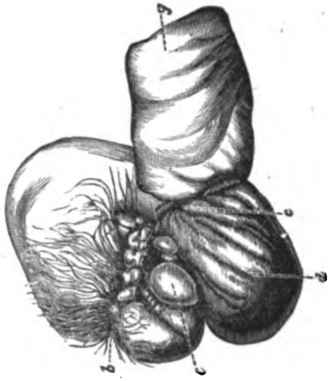

Fig. 7. A parasitic fœtus removed from the sacral region of a child. (After Treves.) c, the largest digit. d, a piece of gut protruding through the slit, e. g, the pedicle.

For a fuller consideration of the facts relating to parasitic fœtuses, the reader is referred to a paper on the subject in the Gynæcological Journal, Vol. IX., p. 164.

Having sketched out the more important features of the three groups, we must now consider the evidence in favor of this mode of classification.

SECTION I.—SEQUESTRATION CYSTS.

Dermoid cysts arising in detached or sequestrated portions of surface epiblast occur in the median line, and may be considered in three groups, I. DORSAL. II. VENTRAL. III. CRANIAL.

In order to comprehend in its full significance the ætiology of this interesting group, we must consider briefly the main features connected with the formation of the body walls. In a transverse section of the body of a mammalian embryo at an early period of gestation, we find that it consists of two bilateral portions united by an isthmus. This isthmus contains the notochord, flanked on each side by the mesoblastic somites. Its lateral parts present a smaller dorsal moiety which may be considered as upgrowths from the larger ventral portions. The dorsal upgrowths tend gradually to fuse across the median line to complete the spinal cord and the skin covering it. The tissue which serves to separate the cord from the integument, arises from the intrusion of mesoblastic elements to form the vertebral column.

Ventrally each half subdivides, the inner layer, the splanchnopleure eventually coalesces with its fellow to form the walls of the gut, the outer which is continuous at first with the amnion also fuses with its fellow to form the body walls, hence it is termed the somatopleure.

Coalescence may fail to occur at any spot along this extensive line or even throughout the whole length of it. If it fails at certain spots we may get such conditions as ectopia cordis and eventration.*

Dorsally this line of coalescence extends from the occipital protuberance to the coccyx, then passes beneath the notochord and extends ventrally involving the perineum, scrotum in the male, abdominal and thoracic walls, neck, symphysis pubis and finally becomes arrested at the septum nasi. The line of coalescence also extends from the septum nasi through the mid-line of the palate to the uvula. It also involves the tongue; the original cleft in this situation extends from the mental symphysis to the hyoid bone. In any part of this line epiblastic involutions occur, which may manifest themselves as dermoids. As is the case with any other species of tumour germs, three roads are open to these involutions. (1) They may disappear. (2) They may persist throughout life and cause no trouble, or (3) they may form cysts.

Examples of dermoids occurring in this line of coalescence will now be considered.

I. DORSAL GROUP.—Along the mid-dorsal line, dermoid tumours are very rare, and it is necessary to avoid confounding them with spina bifida tumours. The most typical case known to me is reported in the Journal de Medecine de Bordeaux, March, 1887. In this instance a dermoid cyst occupied the middle line of the back. The interior was lined with skin furnished with hairs. The cyst was connected with the neural canal, and extended into the spinal cord so that its interior was in communication with the central canal of the cord.

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* Ectopia vesicæ admits of another explanation. See Shattock Path. Trans., 1887.

This case is of exceptional interest when we reflect that in the early embryo the cells which ultimately constitute the epithelial lining of the central canal of the cord are directly continuous with those which are destined to become the superficial epithelium of the body.

II. VENTRAL GROUP.—*Scrotal Dermoids.*—There are very many good reasons for believing that the majority of dermoids reported as being testicular were really scrotal. This was clearly so in the following case reported by Mr. Bilton Pollard,* as a dermoid cyst of the testicle. It was situated in the left side of the scrotum between the testicles and was adherent to the back of the left one. It was outside the tunica vaginalis. The cyst was filled with a putty-like material in which there were a few grey hairs. Three grey hairs were found growing from the interior of the cyst-wall. The wall of the cyst was composed of fibrous tissue lined with stratified epithelium. The papillæ were very rudimentary ; there were a few sebaceous glands in the cyst-wall.

Lannelongue gives reference to numerous cases in his work on Kystes Congenitaux, 1866.

Penile Dermoids.—The penis, as is well known, is formed by the union of two lateral moieties, the line of confluence being indicated in the adult by the prominent median raphé so conspicuous on the under aspect of the penis.

From what has been already mentioned regarding the predisposing circumstances leading to the formation of sequestration cysts, we may anticipate the occasional existence of dermoids in this situation.

Although penile dermoids are rare, nevertheless some instances have occurred. In one case referred to by Lannelongue, the cyst was connected with the prepuce. Other authors have described small dermoids in a similar situation. It is rare to find them in any other part of the penile raphe, but an undoubted instance has been mentioned to me; the cyst was attached to the penis, where it joins the scrotum.

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* Path. Soc. Trans., Vol. XXXVII., p. 342.

The ventral line of coalescence extending from the penis to the cephalic end of the body is, like the corresponding dorsal region of the trunk, rarely the seat of dermoid cysts until we reach the angulus Luodvici, where they again become frequent.

An opportunity has never occurred to me of dissecting or even of examining a dermoid along any part of this line. Dermoids have been described as occurring at the umbilicus, but we must remember that ovarian dermoids exhibit a tendency, especially if they attain large dimensions, to become attached to the abdominal wall at this spot.

It must also be borne in mind that parasitic fœtuses are frequently found along this line and fœtuses attached by their sterna are of fairly common occurrence. Eliminating these cases, then we must come to the conclusion that the region from the manubrium sterni to the penis is a rare one for dermoid cysts.

Dermoids in the mid-line of the neck. Dermoids in this situation occur most frequently immediately above the manubrium sterni, at the spot known as the angulus Ludovici. In this spot they may attain goodly proportions and dip deeply behind the manubrium and invade the superior mediastinum.

It may be mentioned here that cases of imperfect coalescence along this line have been described by several observers. Among them may be mentioned Dzondi, Ascherson and Virchow. The defect consisting in minute canals, lined with epidermis capable of admitting a probe and leading to the trachea.

Dermoids have been described situated in the middle line between the symphysis menti and the hyoid bone, and Lannelongue* has figured and described a specimen of this nature which actually occupied the mental symphysis.

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* Traite des Kystes Congenitaux; 1886.

The mode by which such cysts arise is well illustrated by a very rare specimen exhibited at the Odontological Society of Great Britain by Dr. Joseph Walker.*

It was the head of a calf which had a fissure of the palate running from the uvula to the premaxillary bone, but not involving the alveolus. The lower jaws with the skin covering them and the tongue were also cleft in twain, so that the symphysis could be widely separated. The cleft in the tongue extended to the basi-hyoid. The natural hairy integument, continued from the neck, passed on both sides of the cleft and extended quite up to the dorsum of the tongue. The specimen is one of extreme rarity and is of considerable interest; the defect is clearly an arrest of development, the tongue as we know being formed from two lateral portions.

The Palatine Group.—Dermoids occurring in the median line of the palate are of considerable interest, and tumour germs in the form of epithelial pearls have been known in this situation for a long time. It appears that neoplasms perfectly innocent in their nature, but full of epithelial nests occur in the palate, these take origin in little rounded masses of epiblast, inclosed between the two horizontal plates which fuse together in the median line in mammals in order to separate the nasal and buccal cavities. A good account of these epithelial involutions is furnished by Leboucq.†

Mr. Stephen Paget‡ has considerably advanced our knowledge of palatine tumours and has collected several examples of buccal dermoids. As a type case the following may be given:

"A male infant was born with a tumour inside its mouth which was at first mistaken for its tongue, being of the same color and consistence; the soft palate was partially cleft. From the middle of the hard palate grew a tumour, which was lobed, covered with silky hairs, especially on the left side. Its surface was of true skin, with large sebaceous glands, but no papillæ, containing vessels or nerve-filaments; inside it was composed of adipose tissue with a central fascicle of striped muscular fibre radiating outwards towards the surface." *Clerault*, *Bull. Soc. Anat.* 1874, p. 380. All tumors comtaining hairs, occurring in the buccal cavity, are not necessarily dermoids, or even attached fœtuses. The stomodæum acquires its epithelium from the epiblast, and in some mammals, e.g., the hare and porcupine, the interior of the cheek is furnished with hair. Thus cutaneous tumours of the mouth may be dermoid, parasitic fœtuses, or atavistic in their nature.

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* Vide Odontological Transactions, 1887, for a drawing of the head.

† St. Bartholomew's Hospital Reps., Vol. XXII., p. 315.

‡ "Le Canal naso palatine chez l'Homme" and Note sur lez Perles Epithelials de la Voute Palatine Archives des Biologie, Vol. II., 1881.

The preceding group of cases deals with cysts arising by sequestration in the middle line of the body, dorsally and ventrally. Before proceeding to discuss those cysts which originate in obsolete canals, it will be well to consider an intermediate variety connected with the iris. Cysts variously described as sebaceous and dermoid, growing in the iris, may arise in two ways. The majority of cysts of this character, connected with the iris, have been associated with antecedent perforating wounds of the cornea. Clinical and experimental evidence support the view that small fragments of epidermis conjunctival epithelium, or eyelashes implanted accidentally or designedly upon the iris, may, and do, grow into cysts.

Mr. Osborn* suggests that some of these cysts may occasionally be due to the dilatation of some portion of the unobliterated remains of the choroidal cleft to the persistence of which the term coloboma iridis has been applied. They look like small white currants, semi-transparent and pearly, protruding themselves into the interior chamber, occluding the pupil and eventually inducing an attack of iritis.

Osborn also relates a case in confirmation of this view where there was not only a cyst of this kind on the iris, but also a dermoid in front of the ear a little above the tragus.

Further evidence has recently been published by M.

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*St. Thomas Hosp. Rep., Vol. VI., p. 69, and R. Lond. Ophth. Hosp. Rep., Vol VII., p. 245.

Masse* which supports Osborn's views. Cysts of the iris are of rare occurrence, and they are among the most striking and beautiful pathological specimens when seen in the living eye.

III. CRANIAL GROUP.—*Dermoids in connection with the Cranium.*—Dermoid cysts occur with tolerable frequency in connection with the cranium, and in certain definite positions. The most frequent situation is in the immediate vicinity of the external angle of the frontal bone, also fairly often at its internal angle and in the middle line of the forehead at the root of the nose. Other but less common situations are the external auditory meatus, and the pinna. Dermoids have been described as situated in the middle line of the skull, over the anterior fontanelle and in the tentorium in relation with the torcular Herophili.

In all these situations care is necessary in order not to confound such cysts with sebaceous cysts, and to be careful to discriminate between meningoceles and dermoids when the tumour is situated in the middle line of the skull.

An analysis of a large number of these cases collected from standard and periodical literature, as well as a careful examination of numerous cases I have observed and removed, has served to convince me that with the possible exception of those occurring in the external auditory meatus dermoids of the cranium belong to the sequestrated variety. The argument in favor of this view runs as follows: The external ear or pinna is formed by the coalescence of a series of tubercles, six in number. Very frequently these tubercles fail to fuse completely and a fistula lined with epidermis results. It is easy to see that if a space is left between two tubercles, without any external opening, its subsequent dilatation will bring it into the category of cysts.† Those dermoids occupying the tympanum probably arise in the same way as those discussed in the section devoted to branchial dermoids.

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*See Kystes Tumeurs perlees et Tumeurs dermoides de l'Iris Paris, 1885.

† We are indebted to the careful work of His for a clear and accurate account of the development of the pinna. Its relation to congenital fistulæ of the pinna I have discussed in the Journal of Anat. and Phys., Vol. XX , p. 289.

The outer and inner angles of the orbit mark the points where there is every opportunity for a piece of the epidermis to become involuted, as it is the seat of a considerable fissure during embryonic life. It is stretching the imagination to regard defects in this position as originating in branchial fissures, for the anterior limit of these curious clefts is indicated by a line drawn from the angle of the mouth to the external auditory meatus.[*]

Dermoids occurring at the inner angle of the frontal bone must be divided into two classes: Those lying in relation with the orbit, and those situated at the root of the nose. The orbital variety clearly arises in the same manner as those described at the outer angle of the frontal bone.

The dermoids which remain for consideration are those at the root of the nose in the middle line of the cranium, and those lying on the dura mater. Those at the roof of the nose often project between the nasal bone, whilst others cause absorption of the frontal and are in contact with the dura mater. These simulate very closely pedunculated meningoceles. Dermoids occur over the anterior fontanelle and simulate meningoceles.[†]

Prof. Turner[‡] has recorded a description of a cyst which lay within the layers of the dura mater, beside the torcular. It contained hair and was unassociated with any defect in the occipital bone. It occurred in a child twenty-three months old.

Dr. Ogle[§] has observed a similar case in a child two and a half years old. It was associated with a defect in the squamous portion of the occipital bone.

Cysts of these characters in such situations receive a satisfactory explanation when we consider the development of the skull vault. Morphologically regarded, the bony framework of the skull is an additional element to the primitive cranium, which is really represented by the dura mater. Strictly, the term extra-cranial should apply to all structures outside the dura mater. As a matter of fact, in early embryonic life the skin and dura mater are in contact. This relation later becomes disturbed by the intervention of the cranial bones. If an aberration of the skin occur before the advent of ossification, the detached portion may be pushed towards the dura mater, or the skin, or retain, by means of a pedicle, its old attachment to the latter, whilst the bulk of the cyst lies on the inner side of the bone.

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[*] See especially Cusset, *Sur l'appareil branchial des Vertebres.*

[†] Giralde's Lecons Cliniques, p. 342.

[‡] St. Barth. Hosp. Rep., Vol. II., p. 62.

[§] Brit. and For. Med. Chir. Review, 1865.

Hence in cases of cranial dermoids surgeons often find the pedicle of a cyst leading through an aperture in the bone and connected with the dura mater. In my opinion the current explanation of this condition, viz., that the cyst by pressure brings about absorption of the bone, is in such instances incorrect. In the formation of the bones of the cranial vault, the epidermic covering of the primitive skull was not fully detached from the dura mater, and the bone actually formed around the pedicle.

This is well illustrated in the specimen from which Fig. 8 was taken. The parts are preserved in the Museum of Middlesex Hospital, and described as a sebaceous cyst which had produced absorption of the parietal bone; it was connected with the dura mater by a band of fibrous tissue. As far as I am aware no instance of a seba-

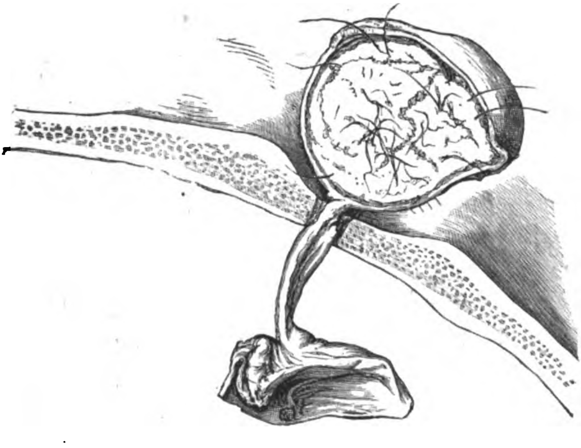

Fig. 8. A dermoid tumour over the parietal bone, connected by a fibrous pedicle with the dura mater. It contained sebaceous matter, cholesterin and hairs.

ceous cyst has yet been recorded, connected with the dura mater; this induced me to re-examine the specimen. Upon cutting into the cyst it was found filled with pultaceous matter mixed with a large quantity of light hairs.

SECTION II. DERMOIDS ORIGINATING IN OBSOLETE CANALS.

By an obsolete canal is understood, in this article, a canal or duct which, in the ancestors of mammals was functional, but which re-appears in existing forms in obedience to the law of heredity. In the ordinary course of development these canals disappear; occasionally they remain persistent, and in some instances act as cyst-germs. The characteristics of these passages are these: they are lined with epithelium, they traverse a mass of mesoblastic tissue, and in many instances serve to bring the epiblast and hypoblast into temporary relation.

The more important of these obsolete canals are:—

1. The cranio-pharyngeal canal.
2. The neurenteric passage.
3. The lingual duct.
4. The branchial clefts.
5. The peritoneal funnels in relation with the ovary.

1. *The Cranio-pharyngeal Canal.*—This passage is a diverticulum from the stomodæum and is situated between the open arms of the trabeculæ cranii and comes into contact with the infundibular process of the anterior encephalic vesicle. The remains of this canal is often very clearly indicated in the adult by a recess in the mid-line of the pharynx, close to its roof, known as the bursa pharyngea, or pouch of Rathke.*

Some typical examples of dermoids arising in this region have been placed on record in the transactions of the London Pathological Society by Messrs. George Lawson, Hale, White and Bowlby. They may be closely associated with the body of the sphenoid bone, or hang as pedunculated pilose tumours into the pharynx.

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*For all that relates to the development of these obsolete canals and their embryology, in so far as it bears on this subject, the reader should refer to my General Pathology, Chap. XX.

2. *Cysts of the Neurenteric Passage.* This remarkable canal continues the central canal of the spinal cord and passes round the caudal end of the notochord and opens into the post-anal gut, Fig. 9. An investigation into the fate of this canal leads one to believe that it is by dilatation of this passage that those dermoids arise which occupy the space between the rectum and sacrum. Should they attain large proportions they bulge upwards and occupy the pelvis. The dermoids which I believe to arise in connection with this duct, present very definite characters and manifest themselves in two forms—either as dermoid cysts, or the rarer variety of dermoid tumours. The cysts are usually situated on the posterior (dorsal) aspect of the rectum and may occur at any spot between the anus and sigmoid flexure. These cysts may contain skin, hair, sebaceous and sweat glands, teeth, bone or cartilage. A typical example is represented in Fig. 10.

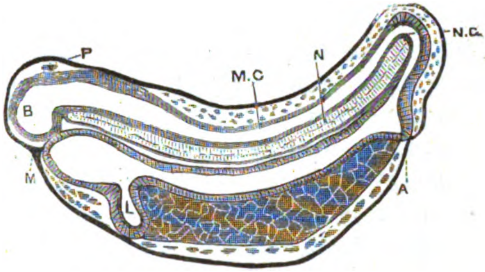

Fig. 9. Longitudinal section of an embryo *Bombinator igneus*. A, anus; B, brain; N, notochord; M, mouth; L, liver; N. C., neurenteric canal; M. C., medullary canal (after Goette.)

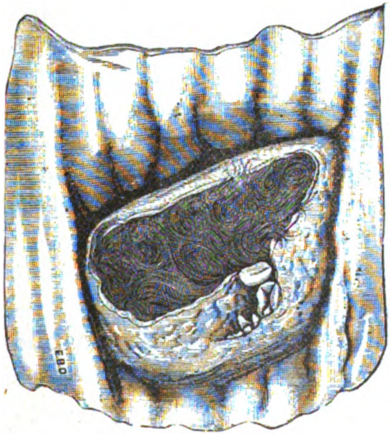

Fig. 10. The posterior (dorsal) aspect of the rectum, to which a dermoid cyst, containing skin, hair, and teeth, is attached. (From the Middlesex Hospital Museum.

Dermoid *tumours* originating in the neurenteric canal present themselves as pedunculated tumours swinging from the inner wall of the rectum, sometimes as high as the sigmoid flexure; they may be attached to within two inches of the anus. The most typical examples known to me are those described by Dr. H. Port[*] and Mr. Clutton.[†] Dr. Port's case is represented on page 299, Fig. 4.

An abundant crop of long hair seems to be a common character of these rectal dermoid tumours. In several cases recorded incidentally in periodical literature, hairs more than two feet in length were found, and in some instances these so annoyed the patients that it was necessary to cut them on account of the inconvenience they occasioned during defæcation. Possibly the irritation of fæces may in part account for the abnormal length of the hair.

In Dr. Port's case the tumour measured 2½ inches in length, 2 inches in width, and 1½ inches in thickness. It is made up of fat, fibrous tissue covered with an investment of skin, provided with papillæ, hair follicles and sebaceous glands. One tooth was also found.

In the report of this case Dr. Port refers to a case published by Dr. Danzel[‡] which occurred in a woman aged 25 years. This tumour coincided in structure with the tumour just considered, but with this addition: The microscope proved that brain substance, inclosed in a bony capsule, formed part of the tumour. This last fact is of very great interest for it serves to strengthen the opinion that these tumours owe their origin to the neurenteric passage. Of course the evidence on such questions as these must be always more or less circumstantial, but recently a very valuable example of abnormal development of the caudal end of the notochord has been published by Ryder.[§]

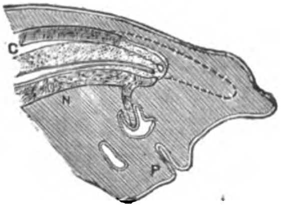

Fig. 11. A longitudinal section through the caudal region of a seventh-day chick. Ch. Notochord. N. Spinal cord. Nc. Neurenteric canal. P. Proctodaeum. I. Intestines.

The condition is represented in Fig. 11. In the drawing which was prepared from longitudinal sections of a seven day's chick, it will be seen that the notochord bifurcates posteriorly into a dorsal and ventral portion. A bridge of tissue connects the dorsal spur with the spinal cord. Immediately above the bridge of tissue a vesicle is seen which must be regarded as a persistent portion of the neurenteric canal, which has become dilated. It is easy to see that with a persistent vesicle, abnormal arrangement of the notochord, and disturbed relation of the mesoblastic tissue in the immediate neighborhood, that had the chick lived, a sacral teratoma would probably have resulted.

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[*] Path. Soc. Trans., Vol. XXXI., p. 307.

[†] *Ibid.*, XXXVII., p.

[‡] Langenbech's *Arch.*, 1874.

[§] American Naturalist, Vol. XX., p. 392, 1886.

3. *Lingual Dermoids.*—These form an instructive group and are interesting for they probably occur more frequently here than in any other region. There exist abundant reasons for believing that many cysts connected with the floor of the mouth and described as ranulæ and sebaceous cysts of the tongue were really dermoids, and many of the later specimens have been described as such.

Dermoids in the floor of the mouth may originate in three ways:—1. As sequestrations of epiblast in the middle line. 2. By dilatation of an unobliterated lingual duct. 3. From persistent branchial spaces.

The two latter forms will be dealt with together, for they are intimately associated. The first group have been already described in connection with sequestration cysts, and there it was mentioned that a duct was formed in the posterior part of the tongue as a result of the incomplete union of the two lateral halves of that organ.

4. *Branchial spaces.*—Dermoids in connection with these clefts are occasionally seen. The general relations and configuration of these clefts are too well known to need description. Dermoid cysts arising in unobliterated portions of these familiar fissures occur as a rule in the line of the sterno-mastoid muscle in various situations. They may be on a level with the thyroid cartilage or as low as the clavicle. In rarer cases they may extend into the parotid region or arise in connection with the pinna. It is significant that they lie in close relation with the anterior border of this muscle and in some instances extend deeply so as to gain an attachment to the sheath of the carotid vessels. As far as can be gathered from a large collection of published re-

ports of these cases, they do not differ structurally from lingual dermoids. They possess a cutaneous lining, from which sprout hairs, furnished with sebaceous glands, the cyst-contents being loose hair, sebum, fat and cholesterin.

5. *Ovarian Dermoids.*—Dermoid cysts occur with extreme frequency in the ovary, indeed it has been stated that two-thirds of the total number of this form of tumour are found in connection with this organ. It is by no means uncommon to find a dermoid in each ovary as frequently as four times in sixteen cases. Notwithstanding the fact that they are so common in this situation, I have deferred their consideration to the end of this section, because it was essential to show the intimate connection between dermoid cysts in certain situations and obsolete canals. An endeavor will be made here to show that by far the larger number of ovarian dermoids arise in such canals. Of all organs in the body not one is so intimately associated, during its development, with so many tubular passages which eventually become obsolete as the ovary. All these canals are lined with a definite epithelium which is in all probability derived from hypoblast, possibly epiblast; many of them open in the free surface of the body cavity, as rudimentary peritoneal funnels and in a situation famous for its high degree of potentiality—the genital ridge. Others of the ducts are closely associated with the mesonephros, and lastly we have the mesonephritic duct (Wolffian) in close relation with the surface epiblast. Now, it is a very remarkable fact that dermoid cysts of the testes are very rare, and this rarity is increased if care be taken to exclude dermoids arising as sequestration cysts in the middle line of the scrotum. This receives explanation from the fact that the ducts which become obsolete, or give rise to dermoids in the ovary, are in the testes functional excretory conduits.

It is also necessary in considering the ætiology of ovarian dermoids to draw a distinction between these cysts and those conglomerations of fœtal tissues which constitute the abnormality known as parasitic fœtuses, for they may occur in this situation as in any other region of the body.

Dermoids of the ovaries present much variety in structure. In the first place the number of hairs in a cyst may be so few as to be easily counted, or they may be innumerable. In length they vary from an inch to one or even two feet. The glands supplying these hairs are liable to considerable variation. In some instances they may be as large and conspicuous as in sections of the hairy scalp, or so small and scanty that perhaps a part of one or at most two appear in a single section. In others the glands are as large as those found in the skin of the nose, the dimensions of the gland being out of all proportion to the size of the hair, and furnishing an appearance on section as though the hair were loosely lodged in the duct of the gland, rather than the gland being an appendage of the hair.

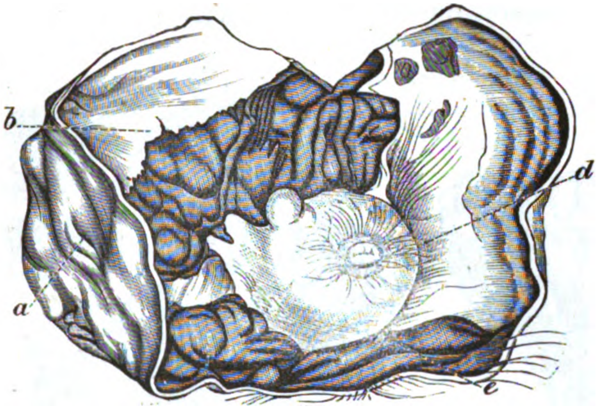

Fig. 12. A dermoid cyst of the ovary with a mammary gland attached to its wall. (After Dr. von Velits.)

The most extraordinary condition to which glandular formations attain in these singular tumours is, when a mamma, furnished with an areola and nipple is found in the cyst, and the development is complete, for on section the mass is found to present the structural characters of a mammary gland. An example of this form of cyst is shown in Fig. 12. The case was reported by Dr. Desiderius von Velits, of Budapest. Not merely did it resemble a mamma in structure, but milk and colostrum globules could be squeezed from it.

Lannelongue states that Haffter found in the parietes of an ovarian dermoid a glandular mass, resembling a rudimentary mamma, and refers to a case recorded by De Sinety, in which an ovarian cyst contained a glandular structure resembling a mammary gland (*Traite pract. de gynecologie*, 2e edit, Paris, 1884, p. 749).

Cysts containing structures of this character are very rare. As far as I am aware von Velits'[1] case is the most extreme instance known. The case serves to support the view that the mamma is an excessively developed dermal gland.

With regard to teeth, the cyst may contain none, or be studded with teeth of various sizes and shapes to the number of one, two, or even three hundred. When small in number the teeth may grow from definite bony masses, which may faintly bear some resemblance to an upper maxilla. The teeth resemble the milk dentition, and some

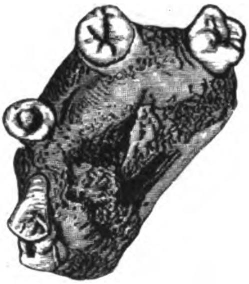

Fig. 13. A piece of bone supporting teeth; from an ovarian dermoid cyst.

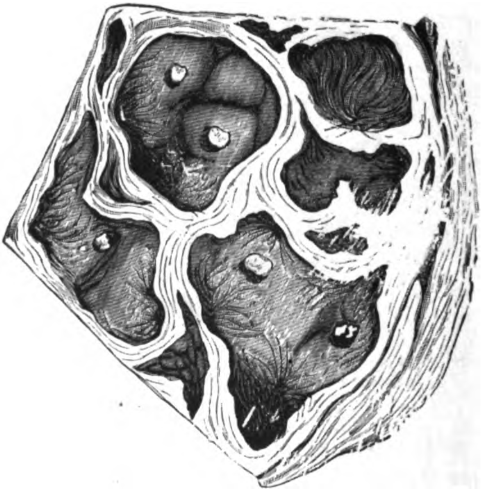

Fig. 14. Section of an ovarian dermoid cyst. Each loculus contained sebaceous matter and cholesterin. From the walls sprouted hair and the cyst contained upwards of 200 teeth.

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[1] Virchow's Archivs, Bd. 107, S. 505.

observers have described germs as of permanent teeth growing in relation with them. As to this I have failed to satisfy myself. The teeth present the usual disposition of enamel, dentine, cementum and pulp, and it is a fact somewhat remarkable that caries with extreme rarity attacks these teeth. Secondary dentine may, however, be found in the pulp chamber. The walls of ovarian dermoids occasionally calcify.

In size an ovarian dermoid may vary from that of a nut to an enormous mass reaching from the pelvis to the umbilicus, and on several occasions a suppurating ovarian dermoid has opened or been opened by the scalpel at the navel. The most remarkable condition, which, so far as I know, has only been noticed in connection with ovarian dermoids, is the distribution of a number of smaller cysts among the omentum, mesentery and small intestines. The most carefully reported case of this nature is by Mr. Moore, in the *Trans. Path. Soc.*, Vol. XVIII. Mr. Moore, however, points out that the majority of these secondary cysts had long pedicles of attachment to the main cyst. This may help to explain a curious situation occasionally attained by them, which we will now proceed to consider. Among dermoids originating in obsolete canals, such as we have been considering, must be included many of those abdominal dermoids described as non-ovarian. The cysts of this group are of great clinical importance as well as being interesting pathologically.

Mr. Alban Doran,* in a careful paper on this matter, adduces excellent arguments in support of the view that many dermoid cysts of the abdomen that have been described as non-ovarian, are really ovarian cysts that have become separated from their pedicles, and this is especially the case with regard to cysts of the great omentum. It is equally certain, as Doran remarks, that all abdominal dermoids are not of this nature ; as, for example, those very rare instances of abdominal dermoids occurring in male subjects.

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* Notes on so-called Non-ovarian Dermoid Abdominal Tumours." *Med. Chir. Trans.*, Vol. LXVIII., p. 235.

Certainly dermoids situated in the space between the rectum and bladder in men and in the fossa of Douglas in women, admit, as has already been stated, of another interpretation.

The greatest argument adduced by Doran in support of his view is a case reported by him* which was under the care of Mr. Thornton. The tumour had existed in the abdomen for seven years, during which period the patient gave birth to four children. At the operation a dermoid cyst was found closely adherent to the omentum. The left ovary was absent, a short, firm tag of tissue hanging from the omentum close to the Fallopian tube.

Recently it has been my good fortune to have the opportunity of examining a very interesting case of detachment of an ovarian dermoid, which was exhibited to the British Gynæcological Society (1887) by Grigg Smith, and of which I furnished an independent report. In this case the cyst was a compound of a simple ovarian (oophoritic) cyst and a dermoid. It was adherent to the omentum, but a frail, thin band of tissue connected it with the right angle of the uterus. An examination showed that the tumour consisted of three inches of the Fallopian tube, the ovary was full of small, abnormally distended follicles, and surmounted by a cyst as large as an ordinary melon. In the middle of this ovary was a dermoid of the size of a tangerine orange, full of oily material; from the walls sprouted a few stunted hairs, furnished with very large-branched sebaceous glands.

The thin ligament which connected the tumour with the uterus was the attenuated portion of the Fallopian tube of the thinness of an ordinary silk ligature.

The examination of this tumour furnished one fact of peculiar interest. Although the tumour was of large size the only point at which omental adhesions existed was that part of the tumor composed of the dermoid. It is a fact well recognized that dermoids are especially prone to contract adhesions to surrounding parts, and many instances are on record in which they have suppurated. In some cases the pus escapes externally and a spontaneous cure is effected or bursting internally terminate the life of the patient. In rare cases malignant growths may spring up in dermoids, and Doran is of opinion that many of the cartilage knobs, osseous masses, etc., in dermoids may be regarded as enchondromata, osteomata, etc.—in fact they may be considered as tumours of a tumour.

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* Observations on Tumours of the Ovary, &c.

The last class of abdominal dermoids which remain for our consideration are those which occupy the space between the rectum and bladder. A study of this class of dermoids is of some value, for it seems to me that it is this variety which has given colour to the opinion that they are due to dropped ova, that is, impregnated ova which miss the Fallopian tube. This absurd view is refuted by the fact that they occur in males and a characteristic example is recorded by Dr. Ord.* The fact, too, that they may be found in man also negatives the possibility that they are ovarian dermoids which have been detached.

Dermoids in this situation I believe to arise in the neurenteric passage and have no connection either with ovary, testicle or dropped ova.

We must not dismiss the consideration of ovarian dermoids without drawing attention to the relation they have with those rare cases in which hairs are either passed with the urine, or as the nucleus of a vesical calculus.

Hairs occurring in the bladder may be derived from two sources. (1) Their introduction from without, accidental or otherwise. (2) An ovarian dermoid may rupture into the bladder and its contents, hair, cholesterin and sebaceous matter voided through the rectum. A full consideration of recorded cases of this event leads me to believe that in most cases this accident is determined in consequence of inflammation and suppuration of the cyst. One of the best descriptions known to me of the rupture of a dermoid with discharge of the contents through the urethra with an account of its distressing concomittants is by Dr. Robert Lee.†

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* Med. Chir. Trans., Vol. LXIII., p. 1. The paper contains several references.

† Med. Chir. Trans., Vol. XLIII., p. 93.

Conclusion.—In the main this article has been one long argument to prove that dermoid cysts and tumours have their origin in detached portions of epiblast, and in epithelial-lined tubes which should, in the ordinary course of development, become obsolete.

It also insists on the importance of distinguishing between cysts originating in this manner, and those heterogeneous masses which represent suppressed or parasitic fœtuses.

Further, those congenital neoplasms containing striated muscle-fibre connected with the kidney and spinal cord do not belong to this category. Finally, the study of dermoids lends, to my mind, the strongest possible support to Cohnheim's view—that many neoplasms originate in detached masses of embryonic tissues.

Labour in the direction of references has been spared me by the timely appearance of Lannelongue's *Kystes Congenitaux*, 1886, which contains an enormous assembly of cases scattered in classical and periodical literature, all of which are carefully and judiciously classified. My indebtedness to this painstaking author is very considerable. The Pathological Transactions have served as a mine, in which I have freely delved, and the memoirs of Cusset, Wagstaffe and Doran have been to me of especial value.

Virchow's invaluable Archivs can only be compared to the Path. Transactions, which contain many instructive and carefully reported specimens of these interesting abnormal conditions.

Other sources of information are fully acknowledged in numerous foot-notes.

ART. XXIX. A REVIEW OF THE MUSCLES USED IN THE CLASSIFICATION OF BIRDS.

BY R. W. SHUFELDT, M.D., C. M. Z. S.
Captain Medical Corps U. S. Army.

When Garrod came to demonstrate that there were certain muscles, and groups of muscles in Birds that could be used in them to classificatory ends, he made the majority of his dissections upon Old World forms, and it was the exception when any of our United States bird-types came beneath his skillful scalpel for this purpose. Then, again, his investigations were for the most part published in the Proceedings of the Zoological Society of London where they are not as easily accessible to all American students as they might be; to be sure, Garrod's papers were, after his death, gathered together in a handsome volume of "Scientific Memoirs," but even this work is now already too scarce, and but few copies of it have found their way to this country. In this latter work, too, his excellent labors in this line are scattered through a large volume, and we find no single chapter with appropriate figures especially devoted to all the muscles which up to the present time have proved to be so useful, as one set of characters at least, in determining the affinities of avian groups. Moreover, the present writer has recently added to the list another muscle which he has reason to believe will prove of value in certain orders of birds, both for classification and as an indication with respect to affinity, among others, of these interesting types of vertebrates. (See *Science*, No. 229, p. 623, and No. 234, p. 57). In view of these facts, I have reason to believe that such an illustrated chapter as is alluded to above will prove helpful to many anatomical students upon this side of the water, and to this end the present article will be devoted.

Garrod dealt chiefly with a certain group of muscles which pertain to the pectoral limb in birds; with others that occurred in their thighs; with the obturator internus; with the plantar tendons; and finally, with the musculature of the lower larynx.

In passing I may say here that I am fully convinced that when the myology of birds comes to be still better known, and generally worked out, we will find many other muscles and arrangements of their tendons in various parts

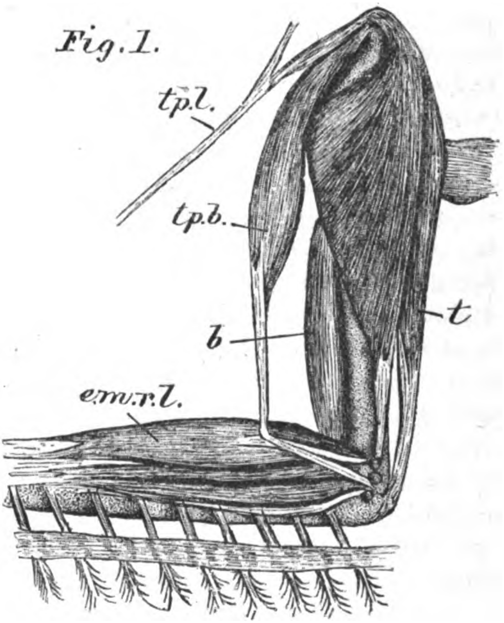


Fig. 1.—View, from the outer side, of the muscles of the patagium of the left wing of a passerine bird. Troupial *Icterus vulgaris* (after Garrod).

of the body, as in the pinion, in the leg, and elsewhere, which also will come into use in the taxonomy of the class. Here, I will have but little or nothing to say in reference to the muscles of the larynx, as we must believe that our knowledge of them in birds has not as yet arrived to that state of perfection where we can efficiently employ them in special classifications. It will be to our purpose to dwell quite fully, however, upon the classificatory muscles of the pectoral and pelvic limbs; of such use as the form of th area of origin of the obturator internus has proved to be; and lastly, a few words with respect to the variations exhibited on the part of the plantar tendons in certain groups of birds.

Let us first, then, turn our attention to the muscles of the *pectoral limb*, and up to the present time the *five* following named ones have been found useful as characters in the classification of the class, or have proved of assistance, when

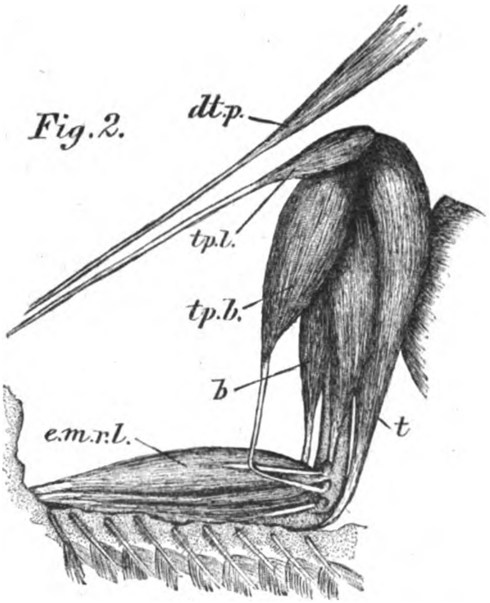


Fig. 2.—Same view and corresponding parts of the same wing of a passerine bird, Purple Martin. *Progne subis*, (by the present writer). *tp. l.*, tensor patagii longus; *tp. b.*, tensor patagii brevis; *dt. p.*, dermo-tensor patagii; *e. m. r. l.*. extensor metacarpi radialis longus; *t.*, triceps; *b.*, biceps; *S. R.*, secondary remiges (fig. 2 nearly × 2).

taken in connection with other structures, in determining affinities.

1. *The tensor patagii longus.*
2. *The tensor patagii brevis.*
3. *The dermo-tensor patagii.*
4. *The bicipital slip to the patagium.*
5. *The expansor secundariorum.*

Garrod found all but No. 3 of these present in one bird

(*Chauna derbiana*), but I have yet to know of one that possesses them all.

Some birds have the first and second with all the others absent; many possess the first three mentioned in the list with the last two absent; and so on. Then, again, they vary, as I say, in their form; their modes of origin and insertion; and in their special modifications. And while all this is very fortunate for the purposes of classification, it will be impossible in an article of the present limits to think of entering upon such matters in their detail. My aim will have been accomplished by simply giving a good description and figure of each of these muscles, and then the student may study their modifications in other bird-forms to suit himself. Should his library contain the Collected Memoirs of Garrod, and his successor, W. A. Forbes, to the prosectorship of the Zoological Society of London, so much the better, for then indeed will he have capital assistance at hand. Forbes, for instance, found some wonderfully interesting and complicated conditions of these muscles in certain sea-fowl. (*Tubinares.*)

Any good passerine bird, as an oriole, for example, has in the musculature of its wing the first three mentioned in the list; and when I say any passerine bird I mean in so far as I have yet examined them. Having secured a good specimen of some such bird, pluck it perfectly clean, being careful, in removing the feathers of the wings, that you do not tear the skin. (Fig. 3). Now with a small, sharp dissecting scalpel make an incision just through the integuments and no more, along the line which I have indicated by the letters *inc.* in figure 3, and then carefully and completely reflect this skin-flap in both directions until all the muscles of the arm and forearm are exposed, even to the tendon which extends from the shoulder to the wrist (*tp. l.*), in the free margin of the duplicature of the skin, here called the *patagium*, in which these muscles are found.

1. The *tensor patagii longus* (Fig. 3, and elsewhere *tp. l.*) Among the *Passeres* this muscle is found to consist of a small fusiform, carneous portion, and a long delicate tendon. Arising as a short, flat fasciculus of fibres, from the

head of the corresponding coracoid bone, being superficial to the carneous portion of the *tensor patagii brevis* with which it is connected by fascia, and still more intimately so with the adjacent *pectoralis major* muscle; this muscle soon terminates in a tendon, which latter supporting the free margin of the patagial membrane, runs directly in it to the carpal joint, where it becomes attached, often send-

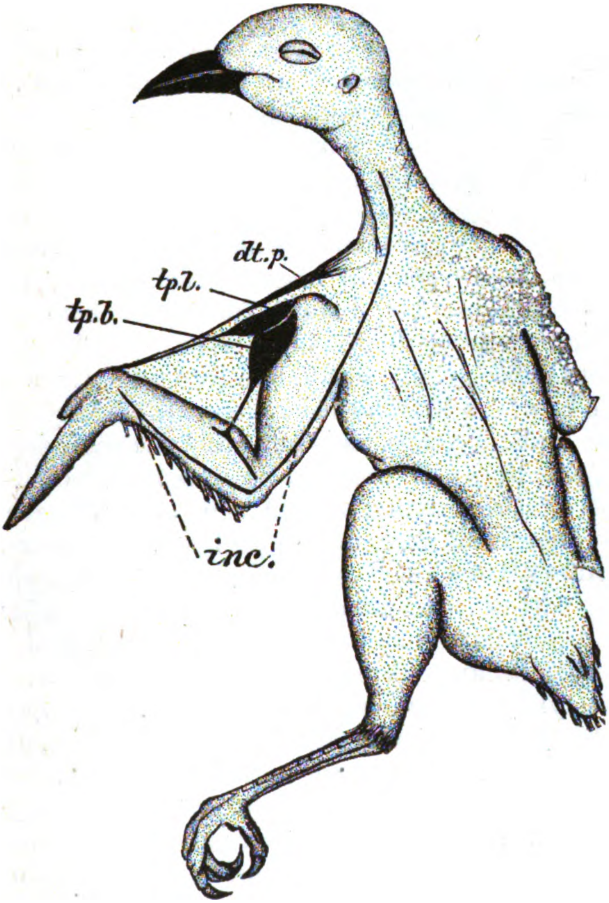


Fig. 3.—The plucked body of a medium sized passerine bird, with its pterylosis not shown, but with the *patagial muscles* of the arm in black, and supposed to be seen through the skin; *dt. p.*, *dermo-tensor patagii*; *tp. l.*, *tensor patagii longus*; and *tp. b.*, the *tensor patagii brevis*; *inc.* the line of incision to be made in order to expose them for examination.

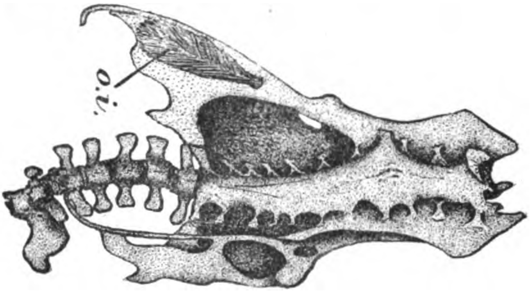
ing a few tendinous fibres over it to be inserted into the pollex phalanx. By following the directions given above, this muscle and its tendon can be easily brought into view in the wing of any passerine bird, as well as in the majority of others.

2. The *tensor patagii brevis* is a muscle that has been so well and clearly described by Garrod (Coll. Sci. Mem., p 356) that I will reproduce his original description here. He says: "In the triangular patagium of the wing of the bird the tendons of two muscles are to be found. One is that of the *tensor patagii longus*, which forms the supporting cord of the free margin of the membrane itself. The second is that of the *tensor patagii brevis*, which courses parallel with the humerus, not distant from that bone, to the muscles and fasciæ of the forearm (See Figs. 1–3 and 5–6 of the present paper, *tp. b.*) In the Ramphastinæ, Capitoninæ, and Picinæ, where this muscle is less complicated than in any other birds, it arises, as is generally the case, from the apex of the upper of the two processes at the scapular extremity of the furcula, as well as by a small special slip from the superficial fibres of the *pectoralis major* muscle, which differentiates itself off from the main muscle near the upper part of its inserted extremity. The comparatively insignificant triangular or compound fleshy belly thus formed, with its apex directed towards the elbow, terminatesin a cylindricaltendon, which, included between the layers of the fibro-cutaneous patagium, takes a straight course to its insertion into the axially-running tendon of the origin of the *extensor metacarpi radialis longus* of Schopss [*e. m. r. l.* in the figures here given], at a short distance from the tubercle on the humerus whence the muscle springs."

"As a result of this disposition, when the fore-arm is half-flexed, the tendon of the *tensor patagii brevis* is seen to enter the substance of the fibrous origin of the *extensor metacarpi radialis longus*, and at right angles. This arrangement is indicated in plate 21 [of his work], and is characteristic of the Picariæ, as defined by myself to include the three sub-families above referred to, and them only."

"Among the Passeres a slight, but easily recognizable difference in the manner of insertion of the muscle maintains. The similarly single cylindroid tendon runs from the muscular belly, which has its origin at the shoulder, as

Fig. 4.



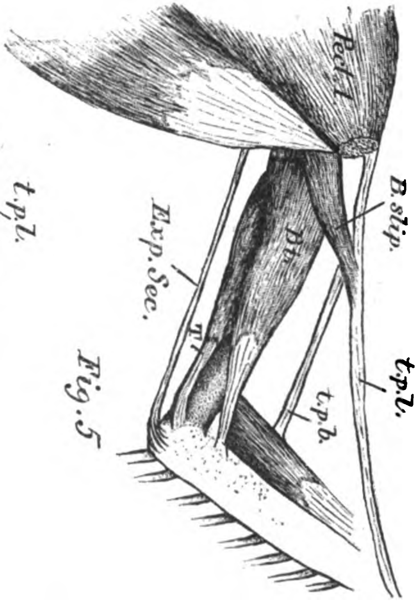


Fig. 5

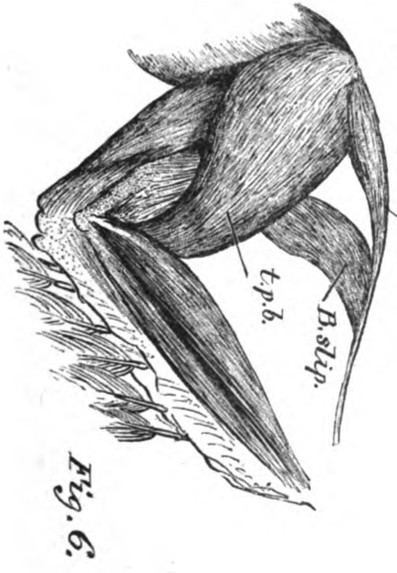


Fig. 6.

Fig. 4. Right three-quartering view of the pelvis of a specimen of the Pinon Jay (*Cyanocephalus cyanocephalus*) showing the origin of the *obturator internus* muscle of the right side, *o.i.* Drawn by the author from the specimen, and somewhat enlarged.

Fig. 5. Axillary muscles of the side of *Gallinula chloropus*. By the author after Garrod. *Exp. Sec.*, expansor secundariorum; Pect. 1, great pectoral muscle; *B. slip*, biceps slip; *Bi*, biceps; *T.* triceps; and other letters as in former figures.

Fig. 6. Outer aspect of the axillary muscles of the right arm in a specimen of the Mourning Dove (*Zenaidura macroura*). From the specimen by the author, and after his own dissections. Letters as before.

above described, to the upper margin of the *extensor metacarpi radialis longus* muscle, at an exactly similar spot: it does not, however, simply blend with the fibrous origin of that muscle: it becomes attached to it at the spot indicated, and then (again considering the forearm as half bent upon the humerus) runs back *independently* to be attached to the base of the tubercle of origin of the *extensor met. rad. longus*, slightly below that muscle's springing-point. As a consequence of this arrangement there are two tendons to be seen running to one spot (that on the upper margin of the *extensor met. rad. longus*, where the tendon of the *tensor* meets it) from two points, one the apex of the tubercle on the humerus above referred to, and the other, the depression at its base. These tendons therefore converge as they leave the elbow, having at first an appreciable interval between them, which is gradually diminished as they approach, although they remain quite free from one another, that of the *tensor* being superficial."

As I have already stated above, the insertion of this muscle is vastly different from that in other orders of birds, and some differences even occur among the passeres themselves, especially when we come to examine the more aberrant types of this vast group.

3. The *dermo-tensor patagii* (See figures 2 and 3 *dt. p.*) It is but a few weeks ago since I originally described this muscle (*Science*, No. 229, pp. 623,624, and 234, p. 57),and as I have not further investigated it since then, my remarks upon it can very appropriately be reproduced here. Of it, I said substantially that among my manuscripts in the hands of publishers, I have some very extensive work upon the myology of birds, illustrated by nearly a hundred original drawings; and, as many of my friends are aware, I have been engaged for a number of months past upon my second contribution to the anatomy of the Macrochires, a work now drawing towards completion. Quite recently, while investigating the muscular system of the Hirundinidae, in this latter connection, I discovered, in the course of my dissections, a muscle for which at this moment I recall no pub-

lished description, and one the importance of which Garrod, even if he knew of its existence, certainly overlooked. When present, its chief carneous portion occurs in the free marginal fold of that triangular duplicature of the common integuments found between the root of the neck and the tip of the shoulder in birds. It first came to my notice in a specimen of *Progne subis*, whereupon I at once dissected a number of other individuals of the same species; and I found it equally well developed in all of them.

This muscle, in part, is a dermal muscle, and arises from the integuments on the anterior aspect of the neck at about its lower third; at its origin its fibres spread out fan fashion, their terminal fibres meeting those of the muscle of the opposite side in the median line. Here it is quite adherent to the skin, but its fibres rapidly converge as they pass in the direction of the shoulder-joint, opposite which region they gradually free themselves from the skin to form a small fusiform muscle, which, ending in a delicate tendon, runs along within the free marginal fold of the patagium of the wing, in common with the tendon of the tensor patagii longus, to blend with it just before arriving at the carpal joint.

Garrod chose the wing of *Icterus vulgaris* to illustrate the arrangement of the patagial muscles in the Passeres, and in his figure of it, a tendinal slip is shown cut short, of which he says nothing, but which evidently belongs to this muscle. Nowhere else is this shown or alluded to in his work.*

I propose to call this muscle the 'dermo-tensor patagii,' it being partially connected with the integumentary system of muscles in the birds wherein I have thus far found it.

Upon dissection, I find it present in each and all of the other United States Hirundinidae; in all true passerine birds, including *Ampelis*; but absent in the Caprimulgi, in the Trochili, in the Cypseli, and, if we may judge for all the typical Passeres mesomyodi from the condition in *Tyrannus tyrannus*, it is also wholly absent in them. Further than this, I have not investigated the matter, but it will be highly interesting, to say nothing of its importance, to look up the subject for other groups of birds. Its importance at once becomes evident by finding it in such a form as *Ampelis,* showing by this character, at least, the passerine affinities of this bird over its clamatorial ones, which latter have been more than once suspected, at different times, as predominating in its organization.

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*Plate 21, fig. 2, of his Coll., Sci. Mem., and Fig. 1, of the present paper.

4. The *bicipital slip to the patagium*, (figs. 5 and 6 *B. slip*). This is a fleshy fasciculus of muscle that is differentiated off from the anterior surface of the *biceps*, and passing between the cutaneous folds of the patagium becomes inserted into the tendon of the *tensor patagii longus* at about the middle of its course.

Garrod states that "the presence or absence of this muscular fasciculus is a very constant character among closely allied birds." He not only found it in the Caprimulgi, but also in Plovers, Cranes, Gulls, Auks and some few other groups. In figure 6, I present its appearance as it occurs in our Mourning Dove, a bird I especially dissected to show it as an illustration in the present connection.

Professor T. Jeffery Parker describes this muscle for the Common Pigeon (*Zootomy p.* 251) as the *tensor patagii accessorius*, and says "its anterior border is connected by fascia with the tendon of the tensor longus, and from its posterior border a long stout tendon is given off which passes outwards, soon becoming parallel to the tendon of the tensor longus, and having a common insertion with it."

If this last tendon be present in our wild pigeons, it is very feebly developed and consequently easily overlooked. I did not detect it in the Dove above alluded to, and must believe it was absent in that particular specimen. Whereever I examined it, it has invariably agreed with Garrod's description of it.

5. The *expansor secundariorum* (Fig. 5, *Exp. Sec.*), although of insignificant size, is a muscle that has proved of no little value as a classificatory one. Garrod spoke of it as the *Ciconine* character, as it was so well developed in

the storks. It occurs in quite a large number of groups of birds, as the *Gallinæ*; the Ducks, Geese, and Swans; the

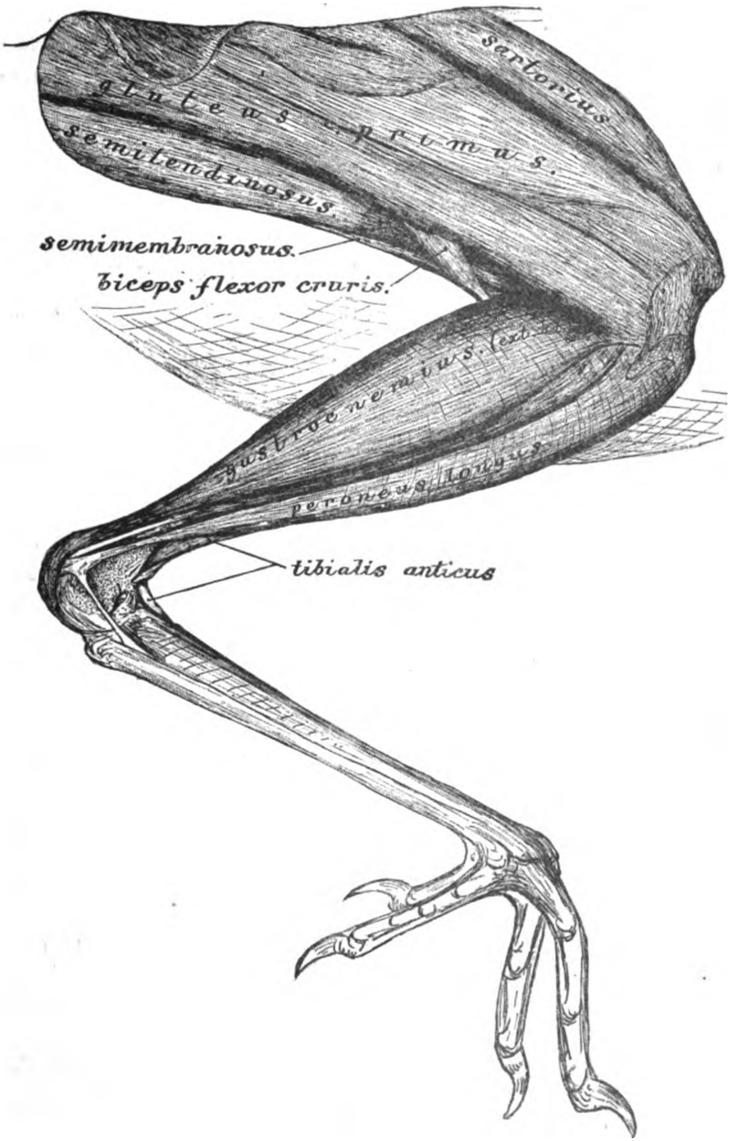

Fig. 7. Outer aspect of the right pelvic limb of the "Road Runner" (*Geococcyx californianus*) showing the superficial layer of muscles, and the first view of the *semimembranosus* and *semi-tendinosus*, two muscles used in classification. Life size by the author from his own dissections.

Rails, Plovers and many others. While "in the majority of the Gallinaceous birds the *expansor secundariorum*, with the normal origin from the secondary quills, has a different method of insertion, which has led Mons. A. Milne-Edwards to describe the muscle in the Common Fowl as a part of the *coraco brachialis* (*brevis*) in his superb work on fossil birds" (Garrod).

Professor Sutton alludes to this muscle in the following interesting way. He says, "every student of human anatomy must have experienced a certain amount of curiosity when he dissected for the first time the plantaris muscle; this strange structure sinks into insignificance when compared with the celebrated ambiens of the bird's leg, or the tendon of the femoro-caudal in the lacertilia. Of all strange muscles, the one known as the *expansor secundariorum* (Garrod) in the bird's wing, stands pre-eminent. It is a small triangular muscle, arising from the quills of the last few secondary remiges at the elbow. Its remarkably long and slender tendon, which frequently traverses a fibrous pulley on the axillary margin of the *teres* muscle, runs up the arm side by side with the axillary vessels and nerves, to be inserted in the thorax into the middle of a tendon, which runs from the inner side of the middle of the scapular element of the scapulo-coracoid articulation, to near the thoracic border of the sterno-coracoid articulation, at right angles to it when the fore-limb is extended.

In the ducks and geese, among the Anseres, the tendons under consideration, when they enter the thorax, run towards one another and join (after having expanded out), in the middle line in front of the œsophagus, and behind the trachea.

My investigations into the morphology of this tendon induce me to believe that it is the representative in the bird's wing of the coraco-brachialis longus of mammals, and the long brachial ligament of man." (*Ligaments, their nature and morphology, p.* 33).

This will prove a very interesting muscle indeed to search for in the various forms of bird life in our own United States avifauna.

OF THE MUSCLES IN THE THIGH OF BIRDS.

There are *five* muscles in the thigh which have proved to be more or less useful in the classification of Birds. These muscles are the following, and four of them I have designated by the letters which were used by Garrod in his myological formulæ.

6. *The ambiens,*
7. *The femoro-caudal,* . . A.
8. *The accessory femoro-caudal,* . . B
9. *The semitendinosus,* . . . X
10. *The accessory semitendinosus,* . . . Y

We know of no bird in which all five of these muscles are absent, or even of one which lacks the last four in the list.

According to Garrod, "when these four muscles are present in a bird the formula, AB. XY expresses the fact; when any one is absent, that such is the case is indicated by the omission of the letter representing it. Thus the formula A. XY indicates that the accessory femoro-caudal muscle only is absent; AB. X that the accessory semitendinosus is missing; A.X that the femoro-caudal and semitendinosus only are te be found; and A that the femoro caudal alone is present."

This eminent anatomist applied these myological formulæ to a classification of the entire group of existing birds, and fully discussed the matter in his work in the most masterly manner in so doing, but it will be impossible to enter upon any such field here. In my own opinion, however, I am inclined to believe that Garrod's classification stands in need of a very thorough overhauling in many of its aspects; by this I mean that in a vast number of cases we are not in possession of the requisite knowledge of the *entire structure* of certain forms as to warrant one retaining them where Garrod has placed them. In other words, these myological formulæ, as time goes by, and our knowledge of avian morphology widens, will surely prove very useful in taxonomy, *but* they can only be employed with safety when taken, as *one set of characters*, in connection with *all* the others that

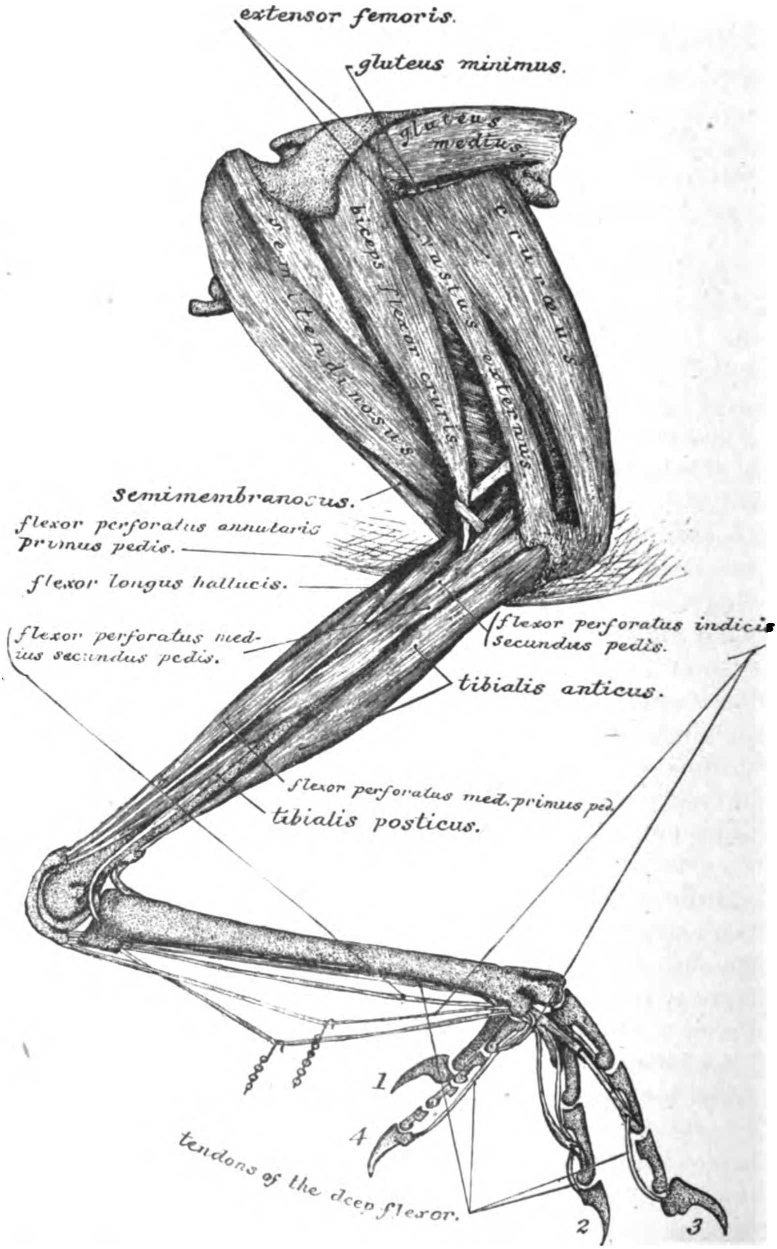
extensor femoris.
gluteus minimus.
gluteus medius.
semitendinosus
biceps flexor cruris
vastus externus
cruraeus
semimembranosus.
flexor perforatus annularis primus pedis.
flexor longus hallucis.
flexor perforatus medius secundus pedis.
flexor perforatus indicis secundus pedis.
tibialis anticus.
flexor perforatus med. primus ped.
tibialis posticus.
1
4
tendons of the deep flexor.
2
3

Fig. 8. Pelvic limb, right side of *G. californianus*, same specimen as is shown in figure 7. The superficial layer of muscles have here been removed, and those found beneath them brought more fully into view. Life size by the author from his own dissections.

the organization of any particular bird-form presents us with, and by no means are we to rely upon them alone, or even when a few other sets of structural characters seem to indicate a bird's affinity.

To illustrate my point, let us turn for a moment to the Swifts and Humming Birds; here we have two groups which for years past have been associated together as allied forms by systematists, and Garrod, too, seemed to believe in their affinity. Why? Because the formula for the thigh muscles in each case was found to be A; the sternum had in each case an unnotched posterior border; and neither swifts nor hummers possess intestinal cœca. Yes, this all may be so, but *all* the rest of the organization of these birds is as widely different as one can well imagine, and consequently they belong to very different orders of birds. This latter statement gains weight when we come to think that aside from the formula for the thigh muscles being the same in *Cypseli* and *Trochili*, their pelvic limbs otherwise are by no means alike in other particulars; and the sternum is, too, of a very different pattern in each case, although, as I say, each possesses an entire posterior xiphoidal margin.

My object will have been attained here when I have presented you with a brief description of each of these muscles, and directed your attention to them in my drawings which illustrate this paper. As will be seen by the figures, I found them *all* present in the pelvic limb of *Geococcyx californianus*, and this is the bird I have chosen to illustrate my remarks in what follows.

6. The *ambiens* (Fig. 9): This muscle arises from the apex of the prominent prepubic spine of the pelvis, and the fibres passing directly down to the inner side of the femur, and parallel with that bone, form a strong fusiform muscle. As it approaches the patella it terminates in a small flattened tendon, which, piercing the fascial envelop of the knee-joint below the inferior apex of that sesamoid, passes round the joint to become finally lost to the outer side and opposite the summit of the tibia, where some of its tendinous fibres merge with the fibres of origin of the

flexor perforatus digitorum, or, at least, with one of its divisions.

The *ambiens* is overlaid by the *sartorius* muscle, and in the figure is brought into view only through the aid of a small dissecting-hook and chain, which pull it forwards in order that it may be better seen.

7. The *femoro-caudal* (Fig. 9) arises, tendinous, from the lower posterior border of the pygostyle. It soon becomes fleshy and as a narrow, muscular ribbon passes through the tissues overlying the lateral group of caudal muscles proper. Opposite the posterior border of the pelvis it expands to form a prettily shaped and compressed spindle, closely covering the *obturator externus* muscle and the side of that bone. As it nears the femur it again contracts, receives the fibres of its accessory head, and is finally inserted upon the femoral shaft, at the posterior aspect of its proximinal third.

8. The *accessory femoro-caudal* arises beneath the over-arching part of the postacetabular portion of the ilium, just behind the acetabulum and beyond. Its fibres pass obliquely downwards and forwards to join with those of the *femoro-caudal*, and to become inserted with them into the upper part of the femur as already described.

9. The *semitendinosus* (Figs. 8 and 9) is a marvelously well-developed muscle in this form, as is also its accessory head. Its origin fills about three-fourths of the nether cavity formed by the posterior over-arching portion of the ilium, under which it arises.

Posteriorly, the fibres forming its free margin are so arranged as to create a rounded border; the lower end of its arc terminating about opposite the post-pubis of the pelvis. From this origin the fibres of the *semitendinosus* pass downwards and forwards as a great, though somewhat compressed muscle. When within rather more than a centimetre's length of the shaft of the femur, they terminate in an oblique tendinous raphe, which latter forms the bounding-line between this muscle and the next.

10. The *accessory semitendinosus* (Figs. 8 and 9), is composed of coarser fibres than the muscle just described. It

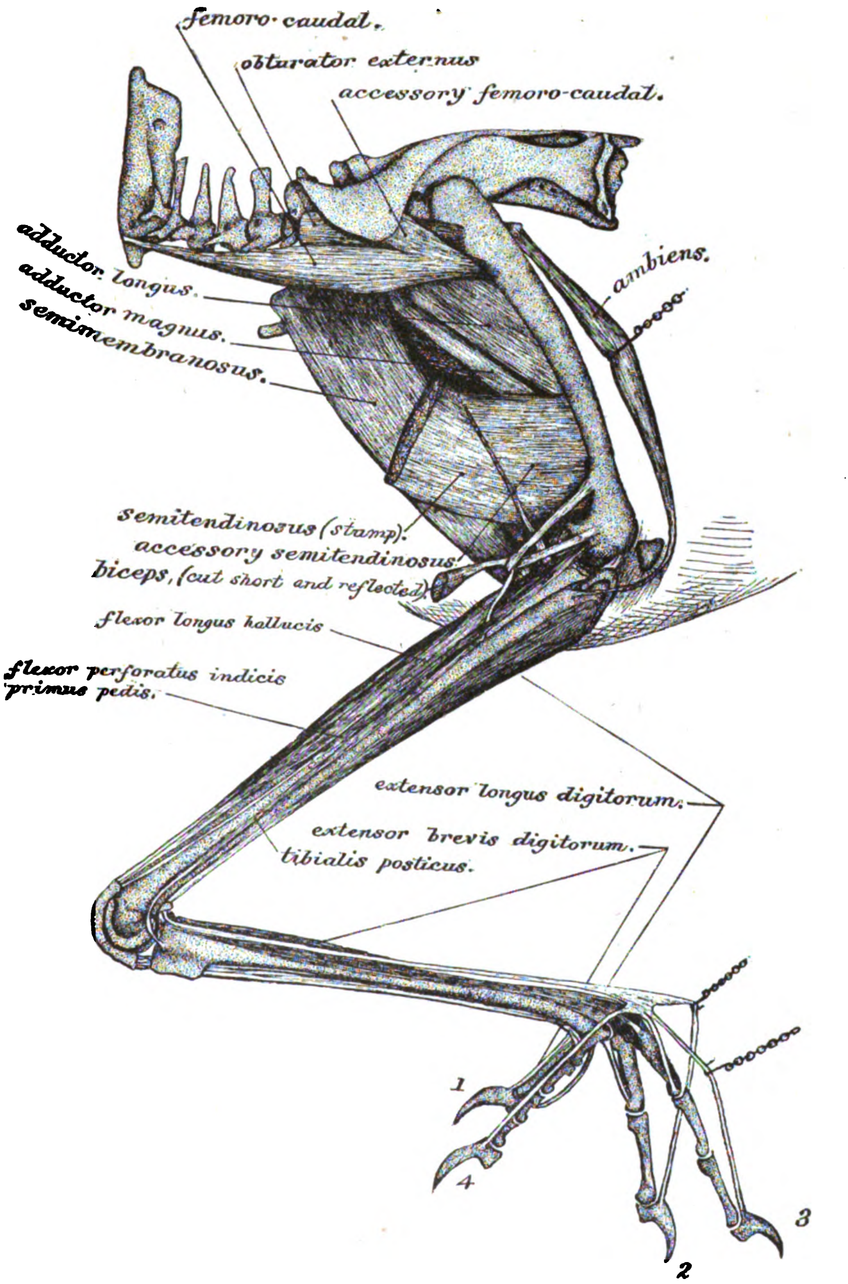

Fig. 9. Pelvic limb, right side, of *G. californianus*, same specimen as is shown in figures 7 and 8. Still other muscles have now been removed, and the *ambiens* is in full view, while other interesting parts are brought into sight. Life size by the author from his own dissections.

springs from a longitudinal line occupying the distal half of the shaft of the femur, and from the upper surface of the hinder aspect of the external condyle of that bone. The fibres pass backwards and a little upwards to become inserted into the tendinous raphe just alluded to. The lower extremity of this tendinous raphe terminates, in *Geococcyx*, in a thin, flat, and delicate tendon, which continues downwards and forwards to the inner surface of the head of the tibia, where it becomes inserted, the point of insertion being found above that of the *semimembranosus* muscle, the insertional tendon of which overlaps it.

As in the case with the other muscles described in the foregoing paragraphs, ornithotomists have a fine field open before them in dissecting out this group of thigh muscles in our United States birds; making full notes upon their researches, and comparing carefully with the work already accomplished by the indefatigable Garrod. In doing this, not merely the absence or presence of the five muscles last described should be noted, but if possible, full notes made as to their *exact* origins and insertions, their *relative* size as compared with other allied birds, and in short their morphology in its details.

THE AREA OF THE ORIGIN OF THE OBTURATOR INTERNUS.

In birds this muscle arises, as shown in the figure, from the central surface of the pelvis, its fibres being attached to the post-pubic bone and the ischium. As a rule it is a bipenniform muscle, its fibres being directed forwards, but at the same time, on either side of its own moiety, towards a longitudinal tendinous and mid-line of its own. This tendon becomes stronger as it approaches the obturator foramen, and passing through this, is finally inserted into the head of the femur of the corresponding side, and upon its outer surface.

Now in a great many birds the area from which the *obturator internus* arises is of an *oval* outline, while on the other hand in nearly an equal number of the class, this area will be found to be a *triangular* figure. So it has been said, that it can thus be utilized as a good character, in this way, when taken in connection with others. In some few birds I understand, it is difficult to determine whether this area of origin is *oval* or *triangular*, but as a rule no such difficulty presents itself. For my own part it constitutes a difference which, I am free to confess, I had as yet paid but little attention to, as for several years past neither the proper material nor other facilities for such investigations have been available. Nor am I quite sure in my own mind as yet, how far the form of the hinder portion of the pelvis may influence the origin of this muscle; and whether such birds do not exist wherein a large *obturator internus* is demanded, and where their pelves are *short*, in which cases the muscle, to gain a firmer origin, would naturally spread out posteriorly, and thus of necessity become *triangular*.

But as I say, I am not prepared to pass final judgment on this matter, and render a personal opinion as to whether much reliance can be placed upon it as a useful character in determining affinities among birds.

Here then again is a field open to decide an important point, and one easily to be understood, and not difficult to render extensive records about. Those living where land and water birds occur in abundance could soon determine whether (or no) this character possessed any taxonomic value or not, and the result would surely prove of service to ornithology.

ON THE MUSCULATURE OF THE SYRINX.

Research of a far more extensive character will have to be made in this direction before results can be attained, and data secured which can be generally used with effect in classification. Much of course is already known, as we are aware for instance, that in the true oscine type four or five pairs of intrinsic muscles are found associated with the syrinx, and these are inserted into the three upper bronchial semi-rings *at their extremities;* hence these birds have been designated as the Passeres Acromyodi, and in them the syringeal apparatus is of a very complex nature, holding the highest place among birds as an organ of voice. On the other hand we have the Passeres Mesomyodi, or the

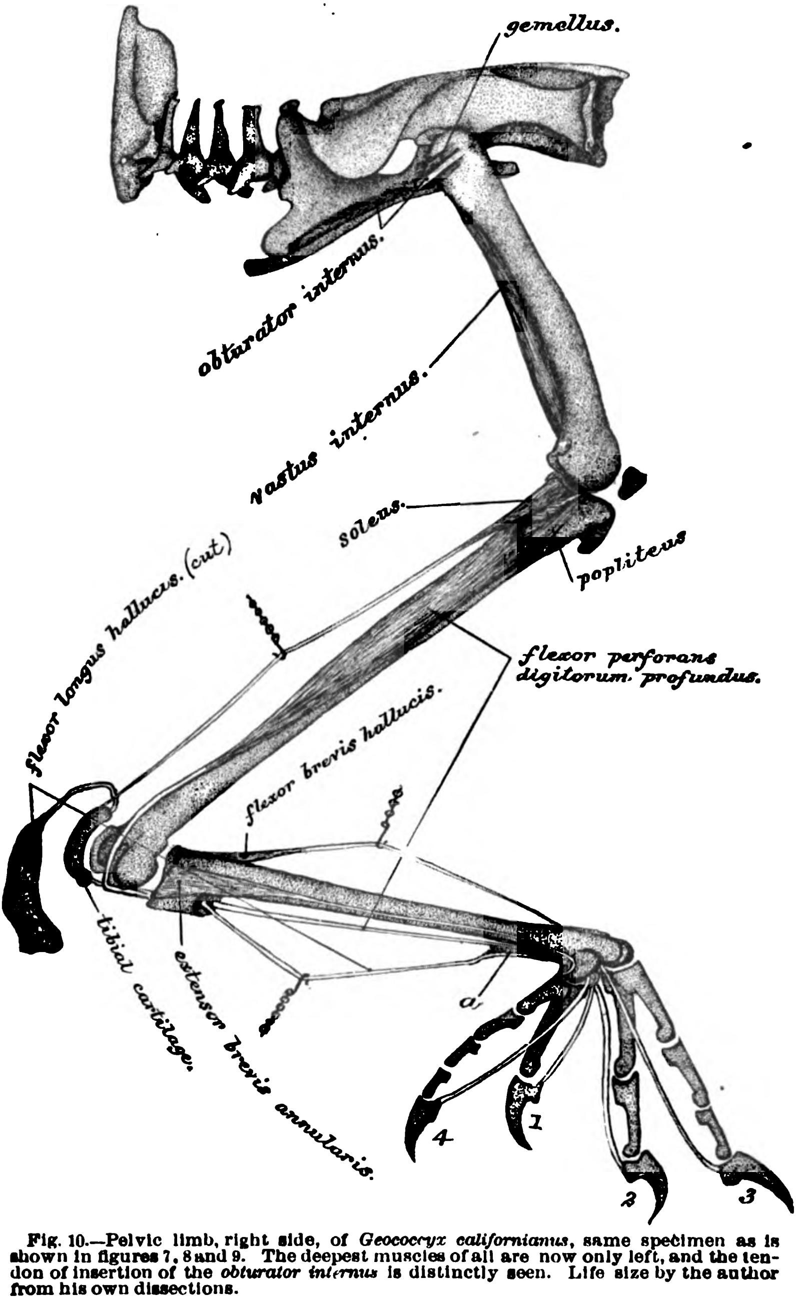

Fig. 10.—Pelvic limb, right side, of *Geococcyx californianus*, same specimen as is shown in figures 7, 8 and 9. The deepest muscles of all are now only left, and the tendon of insertion of the *obturator internus* is distinctly seen. Life size by the author from his own dissections.

Clamatorial Birds, wherein the intrinsic muscles of the syrinx are fewer than four pairs in number, and where they are inserted into the middle points of the upper semirings of the bronchus; and consequently the apparatus here is of a less complicated and of a less perfectly developed a character as an organ of voice. As examples of the first group we have the Thrushes, the Wrens, the Warblers, the Finches, the Crows and many others; and in the second group the Tyrant Flycatchers.

Where some good work remains to be done, however, among the birds in this country, is in the various groups of the so-called water birds; in the Gallinæ and in the Picidæ, and other groups. The form the trachea itself assumes is, of course, of prime importance in these birds, and in many cases the muscular part of the apparatus will be found to be but feebly developed.

ON THE ARRANGEMENT OF THE DEEP PLANTAR TENDONS IN BIRDS.

Both Professor C. J. Sundervall and Professor Garrod have paid considerable attention to the disposition of these tendons in the feet of birds. If I mistake not, the first-named author was the writer who originally invited attention to the fact that the tendon of the *flexor longus hallucis* was completely independent of the tendon of the *flexor perforans digitorum* in the Passeres: and in view of this fact he grouped these birds together and as the Hoopoe (*Upupa*) exhibited the same condition, he included that form with them. Garrod pushed the matter much further, however, and made some very extensive dissections upon the deep plantar tendons in a great many different orders of birds.

Irrespective of the plan of the foot, in all birds, in so far as its digits are concerned, there are two muscles present in the leg, which, arising from the tibia and fibula, send each a tendon to the toes as *flexors*, these muscles are the *flexor longus hallucis* and the *flexor perforans digitorum pedis.* In passing through or over the hypotarsus of the tarso-metatarsus, at the back of the ankle-joint, the tendon of the *flexor longus hallucis* is either *superficial* or *external* to the tendon of the other flexor mentioned.

This fact is useful to be borne in mind in identifying these tendons in our dissections. Now after they pass a short distance down the back of the tarso-metatarsal bone their behavior in different birds is quite diverse, and a few examples of it will be here presented in order to show that when our knowledge becomes more full in the premises, the character will prove a useful one in classification of birds; and also it is hoped to induce those interested in the science of anatomy to undertake and carefully record researches upon this subject. Before arriving at the podal phalanges, and in the sole of the foot of any bird, these tendons divide into a sufficient number of slips to be distributed to the former, one slip going to each toe. The method of division is the same for the bulk of avian families, and the more universal type is well exemplified in the Common Chicken (*Gallus*).

Figure 12 of this paper shows this arrangement in the Fowl, and there we observe that the tendon of the flexor to the first toe is *external* to the tendon of the *flexor perforans digitorum* as it passes the ankle-joint.

At the back of the tarsus it crosses the latter superficially, and then passing directly to the under side of the hind-toe it becomes inserted into the base of its ungual phalanx.

Now the larger tendon of the *f. p. digitorum*, after arriving at the sole of the foot, trifurcates, and a slip is sent to the under side of each anterior toe, where passing forwards they too become inserted at the bases of the ungual digits of the respective phalanges. Just above this trifurcation the tendons of these two muscles, however, are connected, and that by a fibrous *vinculum* (Fig. 12, V) which passes between them.

The fibres of this vinculum come off from the tendon of the *flexor longus hallucis*, and pass downwards to soon merge with the fibres of the tendon of the *flexor perforans digitorum* at the crossing. This arrangement, of course, influences the action of flexion in the foot of the passerine bird, but this question does not especially concern us here.

The strength and size of the vinculum is different in nearly every group of birds where it is present. In figure 10 at *a*, I have shown the position and size of this vinculum as I found it to be present in the Ground Cuckoo.

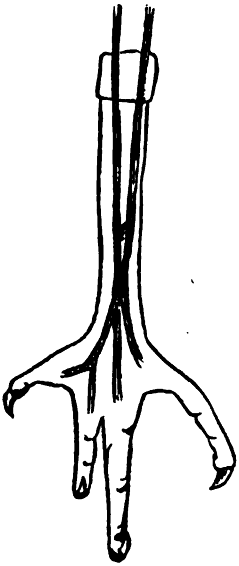

Fig. 11

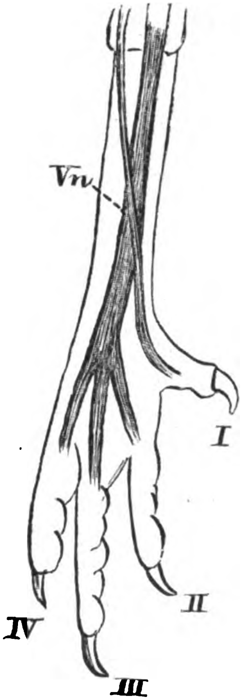

Fig. 12.

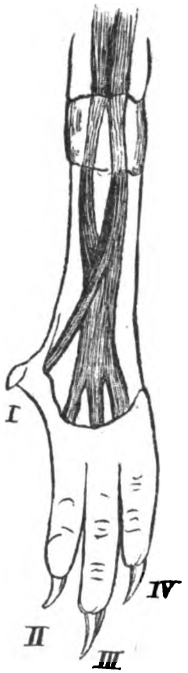

Fig. 13.

Fig. 11. Right foot of *Megalæma asiatica*, showing an arrangement of the plantar tendons.

Fig. 12, Left foot of *Gallus bankiva*. V. vinculum running downwards from the outer hallucial tendon to the inner digital common tendon.

Fig. 13. Right foot of *Apteryx mantelli*. (All three figures copied by the author from Garrod.)

In order to show how different this disposition of these plantar tendons may be, I quote Garrod's description of his dissection of the foot of a specimen of *Megalœma asiatica* (fig. 11). He says, in this bird "the two tendons descend behind the ankle as usual, having their origins typical. There is nothing peculiar till they have descended two thirds down the tarso-metatarse. About opposite the middle of that bone the *flexor longus hallucis* sends a vinculum downwards as in the Fowl, to join the tendon of the *flexor perforans digitorum.* Just above the metatarso-phalangeal articulation the tendons become arranged for distribution in a most uncommon manner. The tendon of the *flexor perforans digitorum* does not split up, but runs to one digit only, namely, the third toe, which is the outer of the two that are directed forward. It is covered superficially by the *flexor perforans digitorum,* just as that latter muscle is splitting up to be distributed to the hallux as well as to digits 2 and 4. In these birds we have, therefore, the *flexor longus hallucis* arising from the lower surface of the femur only, running through the ankle at the outer side of the other deep tendon, and sending a vinculum downwards—all of which are special characters of that muscle only, it being distributed to three toes, whilst the *flexor perforans digitorum* only supplies one."

In figure 13 the arrangement in the *Apteryx* is well shown, where the vinculum is so large as compared with this band in the Fowl, that it almost appears upon sight that the two flexor tendons are fused into one common one, at the point of union.

A close study of this arrangement, however, will throw much light upon the variations as they are to be found in the less typical birds in this respect.

ART. XXX.—SCALMA.

BY RUSH SHIPPEN HUIDEKOPER, M.D.

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The differentiation of the various diseases which have popularly been included under the terms of distemper and influenza until comparatively recent date, has been so slow and so tardily accepted by the majority of practitioners, that we have been subjected to constantly see announced in the daily papers the appearance of some new disease. These new diseases of the populace and of the empiric are to us but the epidemic outbreak, or the more severely manifested form of some ordinary contagious disease. We treat several cases of different troubles in the same stable, without having the time or seeing the necessity of explaining them to the owner, when suddenly one of them spreads to the rest of the stable in an epidemic form, and our clients will not understand that all of the animals have not suffered from the same illness.

There is, however, one of the contagious fevers of the horse, which has constantly been confounded with other diseases, and which has not been separated from them in our English text books. As this disease has received no proper name in English I shall use for it the name given by Professor Dieckerhoff, of Berlin, who first described it in the Adams Wochenschrift XXIX. in 1885.

Etymology.—The term scalma is derived from the old German word *Scalmo*, *Scelmo*, *Schelm*, which indicates roughishness or knavishness, as great nervous irritability, especially of the temper, is one of the characteristic, almost diagnostic, symptoms of this disease. The term "Heimtückische Krankheit," signifying malicious, treacherous or mischievous, is also employed in German for the same trouble. I am not aware of any name in English or French which has been applied to it.

As I am opposed to employing in veterinary medicine any of the nomenclature of human medicine, except for identical, simple and inflammatory diseases, or for intercommunicable contagious diseases, I will not offer the term whooping cough as a name, but will suggest a certain similarity between the latter disease in man and scalma in the horse.

Definition.—Scalma is a contagious and infectious febrile disease of the horse, with local lesions of the bronchi, trachea and larynx, which is evidenced by cough. It is further characterized by great irritability of temper. It occurs as a stable plague—that is, in enzootic form with, however, great variations in the susceptibility of the animals to contract it. It is rarely fatal except from complications.

Incubation.—The period of incubation is from six to seven days, but the disease may develop in two days after exposure or it may delay its appearance for ten days. It spreads through a stable slowly, developing at times in a horse placed in a stall where the previously sick one had stood, or it may pass next to an animal several stalls away. One attack is usually protective.

Symptoms.—The symptoms are ushered in by fever, in which the acceleration of the pulse and respiration is in no way in accord with the great elevation of temperature. With the appearance of the fever is developed a diffuse bronchitis which is, however, *subacute,* both in its character and in its course. At times the bronchitis may extend to the trachea, larynx, pharynx, or even to the nasal fossæ.

In two or three days a trifling grayish, albuminous discharge occurs, which continues, variable in quantity, for eight to fourteen days, or even may last for three weeks. The cough is short, rough and painful, spasmodic in its occurrence and in character. The slight watery or slimy discharge may become more profuse, purulent, or even "rusty," if the bronchitis has extended to the neighboring structures. Pharyngeal discharge may take place.

The respiration is moderate and only affected during an access of cough, or in complicated cases. The pulse undergoes but little quickening. The temperature rises rapidly to 39° C., 40° C., and in some cases even to 41.5° C. (107½° F.) The latter temperature usually, but not always, indicates complication by pleurisy. In ordinary cases the temperature drops in two or three days after the appearance of the cough. The hide is dry and rough with the hairs on end.

Emaciation may be rapid. The mucous membranes are moderately reddened. The appetite is diminished, but the animal chews constantly. Deglutition either of food or water is frequently the cause of spasms of coughing, and these in turn seem to warn the animal against attempts at swallowing. On percussion no alteration is to be detected.

On auscultation mucous rales are heard, with at times tubular breathing ; the latter, however, we will study under the complications, as also the friction warning of pleurisy. Throughout the course of the disease we have still one constant and characteristic symptom—nervous irritability. With a temperature of 104° F. to 107° F., the horse still flinches to the touch on the loins ; stands frequently with head up, and is on the alert for the entrance of anyone to the stall. The previously good tempered and quiet horse will turn and bite, will strike with the hind legs, or at the first touch to the side, head or throat, will half rear and back into the corner of the box, or breaking the halter turn backwards out of the stall.

The *course* of the disease is from five to eight days, but the cough may continue for two or three weeks with variable elevation of temperature. As a stable plague the course is from two to three months. The *termination* is by resolution and recovery, or by complications. In resolution the temperature drops, the cough becomes less frequent and less spasmodic in character, the appetite returns and no sign is left of the disease except the fever mark on the hoof.

The complications are *excessive spasm* and *pleurisy.* In the former the cough may be so violent as to convulse the whole animal, the legs are spread and fixed, with the hind ones drawn slightly under the body. The head and neck are extended, with the muscles tense. The cough comes out by rapidly succeeding efforts, or with the first sound the larynx seems to close for a moment, before the rest can follow. In two cases of my own the spasm has been so great that the animal has fallen to the ground. During these accesses the respiration becomes accelerated, and on auscultation of the trachea and lungs, the tubular murmur of pneumonia can be heard. This false murmur, however, disappears at the end of the attack. In the case which fell to the ground the horse would lie for a moment or two absolutely motionless. (In the first I believed that he had broken his neck.) The rapid respiration was then followed by a long inspiration, the animal regained his feet, the respirations became almost normal and the tubular murmur had disappeared. I have seen no fatal termination from this spasm of the pneumo-gastric, but can readily believe that traumatism might prove fatal, or that the spasm might continue long enough to produce asphyxia. The fatal complication is pleurisy. This occurs when the horse has been kept at work after the development of the disease, and is probably in no way specific, but the result of work on an animal with a high temperature. The symptoms are those of an ordinary pleurisy.

Diagnosis.—The diagnosis is based upon the elevation of temperature without corresponding acceleration of the pulse and of respiration; upon the retention of appetite and reflex, with the great irritability of temper, in the presence of a high temperature, and upon the spasmodic cough and ausculatory sounds of bronchitis, with but trifling discharge.

The diagnosis is made from *Œdematous Pneumonia* by the absence of the yellow colorations, the absence of pneumonia, and the less continuous high temperature from *influenza* by the absence of œdema, of ochre coloration and of the typhoid symptoms; from *strangles* by want of enlarge ment of the lymphatics, absence of purulent discharge and abscesses; from *variola* by the non-appearance of pustules and enlarged lymphatics; from *simple bronchitis* as the latter is sporadic, and in it great fever is accompanied by profuse discharge; from *Rheumatic Pleurisy and Pleurodynia* by the history in these of repeated attacks and great temporary pain; from *Surgical fever* by the absence of cause.

Prognosis.—The prognosis is usually favorable. This disease entails only the loss of ten days to three weeks' use of the animal, and leaves the subject with no complicating sequelæ. In some cases I have seen the irritable disposition remain for a length of time, but in every case it has finally disappeared.

As I have suggested, violent spasm might prove fatal. Pleurisy would render the prognosis serious, as the same disease would when occurring from simple causes.

Treatment.—The treatment of a stable should be at once prophylactic. The infected animals should be removed, and complete disinfection of the stalls and area should be made. The individual treatment is simple. The hygienic measures of cleanliness, fresh air without draughts, frequent rubbing and tempting food should be thorough. The digestive tract is to be regulated by small doses of Bi-carbonate of Soda, Sulphate of Soda, Gentian and Tannic Acid. The appetite is to be stimulated by drinks of cold breakfast tea and cow's milk. Anti-spasmodics are to be used when the cough is excessive--the best of these are camphor, belladonna, stramonium and steaming with turpentine. [Turpentine one ounce, water half a bucket.] External frictions of alcohol and turpentine, with hot packs to the loins, will also afford relief. Quinine and Salicylic acid may be used during the elevation of temperature. Prof. Dieckerhoff recommends tracheal injections in ounce doses of the following solution: Acetate of Aluminium, one per cent.; Alum, one-half to one per cent.; Bromide of Potash, one per cent. to two per cent.; water, one hundred.

ART. XXXI.—THE COLON OF THE HORSE—ITS DISEASES AND DERANGEMENTS.

BY THOMAS WALLEY, M. R. C. V. S.

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At the first blush it might be thought that this gut offers for consideration only a very limited amount of material, but I venture to say that there is no organ, nor any part of a single organ in the body of the horse that is more frequently the seat of functional or organic derangement. That it should be liable to mechanical displacement is not a matter for wonder when its great volume and capacity, the bulkiness of its contents and its anatomical peculiarities are taken into consideration. As a matter of wisdom, one would scarcely have given to an animal like the horse, such a voluminous organ as this, and the only apology that can be offered for such an arrangement is that it may serve the purpose of retaining the vegetable matter ingested for a sufficient length of time to ensure the assimilation of its nutrient elements; but allowing this, nature, according to our limited ken, was still in fault, inasmuch as she did not take steps for the more effectual anchoring of such a voluminous organ in a cavity like the abdomen, the capacity of which is ever varying. The wonder to me is, not that the colon is so frequently displaced, but rather that is so seldom displaced; for very little reflection seems to show, I think, that a mere stumble, an awkward position of the body or the assumption of the dorsal posture would be amply sufficient to throw it out of its normal situation, and particularly so when its contents are of a solid or semi-fluid character. That every lesion of this organ can be distinguished during life, no veterinary practitioner will assert, but that we possess tolerably reliable diagnostic signs of some of the lesions in which it is engaged, I shall, I think, be able conclusively to show, while I hope to dispel one or two common fallacies which exist in connection with this organ.

In treating of colic disorders it must be borne in mind that I refer mainly to the double colon; incidentally, the single colon, and the cæcum will receive a small share of attention also. I shall deal with the subject in much the same manner as that adopted in treating of Œsophagal diseases, and as in the case of that organ, so here, I shall first consider functional derangements and symptomatic conditions.

Under normal conditions a constant movement of a determinate character (*peristalsis*) goes on in the colon, whether a reversal of this movement—*anti-peristalsis*—ever occurs may be a mooted point; that such may take place, judging from what we know of experimental enquiry, is possible, particularly under the influence of direct stimulants, *e. g.*, the sodium salts. The normal movement of the bowels cannot be taken cognizance of either visually or by manual examination, but inasmuch as it is accompanied by a more or less rapid displacement of the contents of the colon, certain sounds are produced which are termed *borborygmi* (G rolling and tumbling) and their nature is determined by the character of the colic contents, *i. e.*, if comparatively solid we have a rolling or dull sound produced, if fluid or semi-fluid, a rattling or gurgling sound; if gas, a rumbling sound, while in colliquative diarrhœa, where the solid matter has been evacuated, a clear metallic or tinkling sound is heard. Borborygmus is by many accepted as a measure of the activity of the bowels, and is often eagerly anticipated in cases of colic impaction as a sign that the bowel is about to react, but it is not in every instance reliable to this end, especially where gas is present, as this may produce a rumbling sound by its own independent movements. Moreover, when the posterior bowels are absolutely fixed, as in cases of twist, borborygmus is frequently heard in the uninvolved parts, and even in general intestinal paralysis the movement of gas may be often distinguished.

Excessive motory action constitutes Colic or Spasm (*hyperkinesis*), a condition indicated by symptoms familiar to all professional men, but a condition which should be carefully distinguished from pain as pain. Were I to assert that we can in every instance differentiate between spasm (*cramp*) and pain, I should be asserting an untruth, but for the purposes of this paper it is necessary that I should draw a line between the two states.

Pain may exist without spasm--the reverse does not hold good, at least to the ordinary mind. Violent spasmodic contraction of the intestine produces compression of the terminal fibres of the sensory nerves, and a sensation results which may become agonizing and unbearable; nothwithstanding this, however, the general functions of the body may not be disturbed; true, the pulse is increased in rapidity, in volume and in strength; the respiration is hurried, and there is probably more or less perspiration, but these conditions continue only so long as the spasm persists, and are not accompanied by grave systemic disturbance, not even sufficient disturbance to give rise to fever. Undoubtedly, persistent spasm may produce death by exhaustion, and by interfering with the natural functions and with nutrition of the bowels ; but of itself, it does not produce death, any more than does the tonic muscular contraction of tetanus. *Pain* is not only exaltation, it is perversion of the normal sensibility of an organ or part, and even in the case of the bowel, frequently exists when it is in a condition of akinesis. On its intensity will depend, to a very large extent, the gravity of cases of colic disorder, as, if it is great and continuous, death may result from nervous exhaustion; and even where recovery takes place, a very marked depressive effect upon the animal is produced, which may remain for some days after the cause of the pain has been removed.

In order that I may better illustrate the symptoms of some of the lesions to which I shall refer, I will here differentiate the manifestation of spasm and pain respectively. Colic spasm is indicated by uneasiness, by constant movement of the hind legs, stamping, kicking, alternate lying and rising, rolling, switching or twisting of the tail, hurried respiration, increased pulse ratio and often perspiration. The animal may look back to the abdomen and, even when lying, throw the head violently against its walls, but it does not, as a rule, show any care for its own well-being by the manner in which it assumes the recumbent posture. Frequently a horse will perambulate his box for a few minutes, go partially down on his knees, rise again and continue his perambulations for a period of several minutes, before he makes up his mind to lie down ; but, on the contrary, he will just as frequently dash himself down on the floor of his stall or box, utterly regardless of the consequences, and when down, will throw himself wildly about, fight furiously with his legs and throw his head about as if, for the time, all consciousness was annihilated ; he may, too, roll over and assume the dorsal position, but he does not usually preserve it for a longer period than a few seconds, while in the intervals of enteric relaxation he may, to the ordinary observer, present all the appearances characteristic of health.

In colic pain (*enteralgia*), while its manifestations approximate more or less to those of spasm, there is evidence of a greater amount of actual suffering. From the outset greater care is shown in recubation, and when recumbent, the dorsal position, if assumed, is preserved for a period of some minutes; the eye has an anxious expression; the countenance is wistful, and the head is turned carefully to the seat of pain, and laid gently on the part, and this act is often accompanied by a sigh or a moan. It is generally stated that a horse, when suffering from the pain of inflammation, does not seek to produce, but rather to avoid pressure on the abdomen, but this statement does not always hold good; on the contrary, gentle pressure is sometimes sought, and when brought to bear affords a certain degree of relief; if, however, pain continues and increases in intensity, the animal loses all control over itself, dashes violently about, fights desperately, is utterly careless as to the infliction of personal injuries, assumes various abnormal positions, and ultimately becomes delirious. Thus it happens that attempts to judge of the existence or absence of inflammation are rendered futile, and the supposititious statement that a horse suffering from enteritis is extremely careful to avoid concussion or pressure is disproved.

Other manifestations of enteric pain and suffering, are: sitting on the haunches, circum-perambulating, (often for many minutes or even hours), plaiting of the hind legs, backing and pressing the quarters against prominent and fixed objects, groaning, neighing, (often wildly), clenching of the jaws, gnashing of the teeth, muscular tremors and twitchings, frequent attempts at micturition, with straining, sometimes so violent as to produce prolapse of the rectum and rupture of the intestines, or even the abdominal muscles.

Whatever may be the degree or nature of the spasm or pain, every means at our disposal should be had recourse to in order to relieve it, and every care should be taken to prevent the animal injuring either itself or the attendants; and, if possible, it should on no account be allowed to lie down and roll. Exceptions to this rule in dealing with colic affections there are, and they will be alluded to in due course.

It is not necessary to notice in detail the various means at our disposal for the relief of spasm and of pain. I will merely remark that while all ordinary methods should be adopted, we have few more valuable anti-spasmodics and anodines than Chloral Hydrate, Morphia, Aconite and Atropine; and further, that *venesection* and the rectal injection of Amyl Nitrite, Ether, Prussic Acid and Chloroform *are too often neglected.* I have over and over again succeeded in relieving a violent attack of colic by the abstraction of blood, after all the ordinary remedies had failed.

MOTOR DISABILITY—*Akinesis.*—Considering the immense mass of material upon which the colon has, as a rule, to act, it is fortunate that, with the exception of these *temporary* instances associated with indigestion, cases of *colic paralysis* are rare; nevertheless, *permanent* paralysis is occasionally met with. *Temporary paralysis* of the colon always accompanies acute indigestion, (impaction), and is produced by exhaustion of the muscular coat, mainly through the great pressure exerted upon the nerves by ingesta or gas, may also assist in its production. It is with the reservation already noted, indicated by absence of borborygmal sounds and retention of fæces. *Permanent or Chronic paralysis* is, as before observed, rarely met with; or perhaps I should be speaking more accurately if I said, *it is rarely diagnosed* as a condition in itself. My attention was first directed to it about the year '62, by the late Mr. Moore of London. The causes of Chronic Colic Paralysis are, *a*, muscular; *b*, nervous. The muscular coat of the bowel may become the seat of fatty changes or of atrophy as the result of inflammation, or, more probably, impaired nutrition from deficient nerve force. In the vast majority of cases it is produced by feeding, for a long period, upon large quantities of innutritious matter, *e. g.*, poor hay, bean or pea straw and chaff; and the more voracious the animal, the more likely it is to take place. The actual cause of the nervous form of paralysis is more difficult to trace.

No matter how produced, impaired motory function, in however slight degree, is a predisposing cause of colic indigestion, and must be vigorously combated and, if possible, removed.

The means at our disposal for effecting this desirable end are : careful feeding, the occasional administration of laxatives, combined or alternated with nerve stimulants, digestives and carminatives ; moderate but not fatiguing exercise should also be allowed. In acute temporary colic paralysis, a stimulating purge, *e. g.*, Aloes and Calomel may be all that is required to restore the function of the bowel ; in sub-acute and chronic cases, strychnine is, on the whole, the best agent that can be administered; it also may be combined with small doses of aloes and alternated with nitro-hydrochloric acid. Of galvanism I have never made trial. To the use of physostigmata I shall make reference hereafter in speaking of colic indigestion.

ARREST OF THE SECRETORY AND DIGESTIVE FUNCTION OF THE COLON.

Of the secretory function of this bowel there is little to be said further than that excessive mucous secretion—colic catarrh—is undoubtedly one of the factors in operation in producing diarrhœa ; *vice versa,* arrest of this secretion favors retention of fæces and constipation. That the colon possesses, to a certain extent, digestive functions can scarcely be denied ; were it otherwise, there would scarcely have been the necessity which—judging from the voluminosity of the organ—seems to exist for the prolonged retention of the ingesta within its cavity. Holding, as I do, the opinion that digestion goes on in the colon, I have no hesitation in speaking of arrest of its functions as Colic Indigestion, and in recognizing various degrees of this condition, viz.: Acute, sub-acute and chronic.

ACUTE COLIC INDIGESTION

May or may not be associated with acute gastric indigestion; the complication materially aggravates the symptoms and adds to the gravity of the case. It is most frequently seen in the heavier classes of horses, and in all animals, defects in the masticatory and insalivatory processes, predispose to the condition as does also, in my opinion, inactivity of the liver, and impairment of nerval force. The great determining cause is the ingestion of larger quantities of food than the gut is capable of dealing with; and especially succulents, green or semi-dried vegetable matter, such as clover, meadow grass, vetches, etc., and above all other materials, perhaps, new hay. Potatoes—especially if diseased or decayed—and boiled foods in inordinate quantity, are frequently the cause of acute colic indigestion.

Following the ingestion in large quantities, of such material as those above enumerated, we have firstly, functional and secondly, motory paralysis followed by decomposition, or fermentation of the ingesta, the liberation of gas, (carbonic acid, carburetted hydrogen and sulphuretted hydrogen) and Tympany.

Symptoms and Course.—Acute colic indigestion may be productive of a series of alarming and dangerous symptoms, quickly ending in some fatal lesion, *e. g.*, rupture of the bowel itself or of the diaphragm, or, where gas is evolved, in death by suffocation, or death by exhaustion. The symptoms and conditions presented are aggravated in proportion to the amount of gas given off.

In the early stages, there are symptoms of enteric pain, but not manifested in any particular manner; retention of fæces preceded by relaxative and apparent diarrhœa; inappetence and constant recubation, and, when down, frequently turning the head back to the abdomen; and in some cases rolling on to the back. The animal occasionally gives vent to a grunt, especially if straining is induced by the presence of fæces in the rectum, and small quantities of gas are expelled per anum. The body has a rotund appearance. The animal is dull and its movements are sluggish;

the respiration more or less labored. The pulse full, oppressed and increased in frequency. The mucous membranes deepened in color, and the mouth somewhat dry and musty. The temperature is not as a rule materially elevated from 2 to 3° F. at most. There may be frequent attempts to perform micturition.

This condition of things may continue for several hours with intermissions of pain and distress, but in a longer or shorter period the symptoms increase in intensity, the pain becomes more violent, the breathing more labored, and the nostrils widely dilated; the pulse markedly oppressed and weak, or strong, full and hard; the body more rotund, and on percussion—especially in the upper right flank—there is marked tympanitic resonance. If relief is not afforded, symptoms of suffocation supervene; the superficial veins become distended with blood; the action of the heart irregular, oppressed, and sometimes intermittent; the mucous membranes very dark in color and the skin bathed in perspiration—it is often cold. The pain at this stage may be agonizing, or only of moderate intensity, and in some cases, there seems to be not only paralysis of the bowel, but even paralysis of the senses and of consciousness, the animal frequently standing with its legs abducted, its head depressed and its ears lopped, while the eye is dull and expressionless.

If the case is associated with gastric tympany, there may be marked eructation with salivation, and the respiratory symptoms are usually aggravated. In all bad cases of tympany, it will be found on rectal exploration being attempted, that it is with difficulty the hand is passed into the bowel, and the distended (tympanitic) Colon can be felt through its walls. Straining is often induced when pushed into the rectum and enemata are seldom retained for a longer period than a few minutes. Death is produced by asphyxia, by collapse, as the result of rupture, and by exhaustion, very exceptionally by inflammation. Metastatic congestion of the lungs or of the feet, may take place and thus afford relief from the bowel symptoms. Where straining is severe, the rectum becomes prolapsed and sometimes lacerated or actually ruptured.

TREATMENT OF ACUTE COLIC INDIGESTION.

In treating cases of this type, several important or cardinal principles should be followed, these are: (1), to prevent rolling. (2), to rouse the bowels to action. (3), to relieve the tension in the bowels, and in the circulation. (4), to relieve pain, and guard against inflammation. (5), to prevent sinking, exhaustion.

1. I have no positive objection to any animal lying down when the subject of acute colic, indigestion and tympany, providing it does so quietly, but if recubation is accomplished carelessly and with great force, displacement or rupture will certainly occur, and these contingencies are still more to be dreaded if the animal is allowed to roll over or to assume the dorsal position. To prevent any untoward results from these causes, the patient should be carefully watched and the whip brought into requisition if required.

2. The bowels may be roused into action by the administration of a stimulating cathartic, *e. g.*, aloes (in solution), combined with carminatives and a nerve tonic, as nux vomica. All egesta should be removed, manually, from the rectum and stimulating enemas, as of salt or turpentine, thrown up frequently. Cathartics in reduced doses may be repeated every six hours, and if pain is excessive they should be combined with belladonna, or alternated with opium or morphia.* Friction applied persistently to the abdomen is useful, as is also kneading and the application of some stimulating agent, as ammonia liniment to the skin of the abdomen.

3. Relief of the circulatory and bowel tension, is of paramount importance. If the large venous trunks are surcharged with blood the right heart also becomes overburdened, as do also the pulmonary vessels. The result of this is oppressed heart, pulmonary congestion, imperfect oxidation of blood, and death by syncope or asphyxia; while

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* In all severe cases the advisability of having recourse to eserine, may be considered.

great distension of the colon means, in addition, pressure on the diaghragm and indirectly on the large venous trunks, the lungs and the heart. The means at our disposal for the purpose of relieving tension are *a venesection, paracentesis intestinalis.*

Venesection is, in my opinion, too frequently neglected in gastro intestinal disorder. I have already pointed out its value in relieving spasm, and it is none the less valuable in relieving the circulation in the class of cases under consideration, and in favoring the action of our remedial agents, as also in some cases, in combating tympany. The value of venesection was particulary impressed on my mind on one occasion, several years ago, when, having a particularly bad case of gastro-intestinal tympany under my charge, and having dispatched my assistant and the attendants in different directions for such appliances as I deemed necessary for the relief of the case, I was left alone with my patient, or rather I should say, I had one companion and an invariable one, my pocket case, which fortunately contained a fleam. Unaided, I opened the jugular vein, the blood flowed freely and of a very dark color, and in a few minutes the animal was relieved of all the distressing and alarming symptoms. The heart's action became firm, the respiration quiet, eructation ceased, pain was arrested, and gas passed off in large volumes per anum. As an adjurant, I usually administer a full dose of some powerful stimulant—such as ammonia or alcohol—after venesection.

In all severe cases of tympany the operation of *Paracentesis Intestinalis* should be performed, as the relief afforded is immediate and effectual, and serious complications and results are prevented; not only is pressure at once removed from the diaphragm, and through it from the heart and lungs, but by the removal of the gas from the intestine, the effects of the pressure on the circulation and consequently upon the nutrition of the intestinal walls are avoided. Prolonged distension is always followed by paresis, more or less marked, and thus the period of convalescence is lengthened and a tendency to recurrence or to chronicity is established.

By many practitioners the operation of paracentesis is dreaded and that too because they entertain exaggerated ideas of its gravity and of the danger usually attendant upon wounding such a structure as the peritoneum. The delay which usually takes place in the performance of the operation gives time for serious complications, *e. g.*, pulmonary congestion, enteritis, rupture, displacement, etc., to arise; and in some cases, nervous and muscular exhaustion is so far advanced as to preclude the possibility of recovery.

The first occasion on which I performed the operation of paracentesis, for remedial purposes, was in the year 1871, in the case of a mule suffering from the effects of an impacted calculus; several punctures being made in different parts of the abdomen with great temporary benefit. From that time onwards I have frequently performed the operation without, in the great majority of instances, any ill result; and, (in all cases where it has been performed *sufficiently early* and in which there has been *an absence of complications*) with great benefit. The most annoying result I have met with, and that only on one or two occasions, has been parietal abcess followed by the formation of sinuses.

I have made *post-mortems* of the carcasses of animals in which the operation had been performed at periods varying from several hours to two or three days prior to death, and in only one instance have I seen any evidence of peritonitis having resulted from the operation itself, and in that case there was abundant proof that the health of the animal had been indifferent previously to the fatal attack.

The site of *paracentitis intestinalis* is in one word, at the most salient point or points of distension; and while the practitioner may adopt this rule as a standard one, he must at the same time remember that in the vast majority of cases the most pronounced distension takes place in the *upper right flank*, and that too for the simple reason that it is the region (right lumbar) of the cæcum caput coli. Before performing the operation, the usual surgical precautions. *i. e.* the removal of the hair, cleansing and disinfection of the skin and the aseptisizing of the trocar and canula should be adopted: a preliminary incision through the skin with the lancet facilitates the introduction of the trocar.

The trocar first employed by me was a bladder (human) trocar, and in preference I use it and recommend it to this day, as it is as nearly as possible the right size; and being curved, the canula is gripped by the bowel, and is less liable to displacement when that organ undergoes collapse. Any small trocar may be used. I have, for instance, frequently used my small combined trocar and canula, milk syphon and exploring needle; as also my aspirator needles. The precise spot in the flank at which the instrument should be introduced is, as before stated, the most prominent part and where the muscle is thinnest. On the introduction of the instrument and the withdrawal of the trocar, a rush of gas usually takes place; occasionally, however, the canula becomes blocked by the contents of the bowel. The liberation of the gas is followed by immediate subsidence of all the more alarming symptoms, and the animal often gives a deep sigh of relief. The gas, as it escapes, may be simply tested by its odor and by the application of the flame of an ignited match for the purpose of determining its chemical composition; evidence of the stage of chemical change in the contents of the bowels being at once afforded by these means. Inasmuch as the sudden liberation of a large volume of gas leads to a material alteration in the physical condition of the circulation and of, respiration whereby syncope or collapse may possibly be produced. I always advise that a tolerably large dose of ammonia carbonate be given in a ball a short time before the operation of paracentesis is performed. The canula may be left *in situ* for a period of from a few minutes to half an hour or an hour; but its prolonged retention is only warranted when the practitioner can himself spare the time to watch it, or has at hand a trustworthy assistant. So long as gas (in puffs) escapes through the canula so long may it be retained with safety, but when, by carefully moving the instrument, its free extremity can be felt rubbing against the outer surface of the bowel it should be at once withdrawn, as it is an easy matter to re-introduce it if necessary.

The introduction of medicament per canula is an operation which should never be resorted to unless there is an absolute certainty that the free end of the canula is still in the cavity of the bowel; and in no case should the introduction of agents of an irritant character be risked. Ether has been introduced by a French V. S., with good result; it would act admirably as a stimulant, and if it escaped into the peritoneal cavity it would be less irritant than many other agents—but no young practitioner should prejudice his professional status by attempting it—he had better trust to remedies administered in the ordinary way.

The subsequent treatment of the puncture requires little comment; the application of some antiseptic dressing, once or twice a day, is all that is necessary, under ordinary circumstances; if, however, the tissues around the seat of puncture become inflamed, a cantharides or mylabris blister should be at once applied over an area of several inches, and this should be followed by hot fomentations if the inflammatory action does not subside. Abscesses or sinuses must be treated by ordinary rules.

4. For the relief of pain in cases of acute colic indigestion, the ordinary remedies, as morphia, chloral hydrate, opium, hemp or hyoscyanus, with hot fomentations and the application of anodyne liniments to the abdomen, and rectal injections of chloroform, prussic acid or ether may be employed, and, if inflammation is threatened, aconite and venesection should be brought into requistion.

5. For the purpose of preventing exhaustion, occasional doses of aromatic spirits of ammonia, ether or alcohol may be administered, or ether may be injected into the rectum.

For several days subsequent to an attack of acute colic indigestion, extreme care should be exercised in the general management of the patient, and nerve stimulants and stimulating digestives should be administered. The practitioner, too, should be on the *qui vive* for signs of the advent of sequelæ and combat them vigorously if they arise.

To be continued.

Art. XXXII.—CARBUNCULUS IN HORSES.

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In Volume IV. of Pepper's "System of Medicine" is the following account of Carbunculus as it appears in man :

"Carbunculus is a firm, more or less circumscribed, painful, deep-seated inflammation of the skin and subcutaneous structures, variable as to size, terminating in a slough. General malaise, slight fever and chilliness precede and usher in the disease. Locally, there appears at first a more or less circumscribed circular redness, with swelling, tenderness and pain. Soon a phlegmonous inflammation develops, the surface at times showing vesiculation, the lesion involving an area several inches in diameter and of considerable depth. The progress of the disease is not uniform. At the end of a week or two suppuration is fully established, the first signs of this process appearing about the hair follicles. The tissues are now soft and boggy ; the skin becomes gangrenous, breaking down at numerous points, disclosing centres of suppuration, giving the lesion a cribiform appearance. Finally the whole mass sloughs away, either as an entirety or in portions, and results in an open, deep ulcer, with hard and raised edges, which gradually granulates and heals, leaving a pigmented cicatrix. The area involved varies, and may be extensive, sometimes as much as six or eight inches in diameter. The favorite localities for its development are the nape of the neck, shoulder, back and buttocks. As a rule, the process ends in three to six weeks. Uusually only one lesion exists. When there are several, or where they follow each other in succession, the general condition is apt to become markedly depressed, and even a fatal result is not at all uncommon. * * * *

The inflammation starts simultaneously at numerous points, usually from the hair follicles, sweat and sebaceous glands, extending in all directions, and usually terminating in gangrene of the whole area. The inflammatory centres break down rapidly, from each of which the collected pus finds its way to the surface, thus producing the cribiform appearance. According to Warren, the pus ascends by way of the columnae adiposae to the hair follicles, and thence to the surface. The process may involve fascia muscles and even periosteum and bone. The disease is to be distinguished from *furnucle* by its greater size and flatness, and the multiple points of suppuration. From erysipelas, to which in the beginning it may have some resemblance, it is to be differentiated by the hardness, painfulness and circumscribed character of the lesion."

So much for the description of carbunculus in the human being ; in the horse the symptoms are almost identical, with a few minor exceptions. Williams, in his Surgery, describes, under the head of "Carbuncle of the Coronary Band, or Furunculus," a disease seen in horses, which appeared in this locality last winter as an enzootic, and which was variously called "Foot Rot, "Stinking Scratches," "Suppurative Cellulitis" and "Erysipelas."

Williams' description of this disease is as follows: "It consists of an oval or irregular portion of the coronary substance becoming infiltrated with unhealthy lymph, forming at first a hard swelling of variable size, very painful, sometimes extending all around the coronet, or appearing at other times as several patches, or spots, of inflammation, accompanied by great pain, lameness and high degree of febrile disturbance. After a few days suppuration sets in, most commonly at several points, with ulceration of the softened portions, forming so many apertures or sinuses, which discharge a thin, unhealthy, ichorous pus. The apertures enlarge by ulceration, or even sloughing of their borders, and by confluence constitute a most formidable-looking and unhealthy wound. In aggravated and malignant cases other inflammatory points appear upon the pastern and fetlock, extending, in some instances, as high as the knee or hock, causing sloughing of great patches of skin and subcutaneous tissues, exposing the tendons, nerves, blood vessels, and even the cavities of the joints, and producing so high a state of fever and suffering as to destroy the animal's life."

In the greater number of cases last winter and spring the carbuncle appeared at some distance away from the coronary band, an attack of ordinary scratches generally preceding it, and in all probability this attack of scratches was the primary cause of setting up the inflammation in the hair follicles, sweat and sebaceous glands, which finally resulted in the carbuncle. Three years ago an outbreak of this disease occurred, but it differed from the one we have just had in that the carbuncles were most frequently seated just between hoof and hair and extended downwards and around the coronary band, often causing the loss of the hoof and of course making the constitutional disturbance much greater when that structure was involved. In fact, in all cases in horses, as the carbuncles in these outbreaks were situated on the legs, the constitutional disturbance was much more severe from the fact that weight was borne on the diseased leg, than it would have been if the carbuncle was situated in a less dependent and less used part of the body, as on the neck, or shoulders, or buttocks, where it appears in man. I have seen the disease originate around an interfering cut, the inflammation in the hair follicles, sweat and sebaceous glands being set up in this case by the bruising of the tissues. In all cases which I have personally seen, some lesion like scratches, an interfering cut, or a bruise have always been *primarily* the cause of the carbuncle—the animal, however, always being in a run-down condition. I have, nevertheless, heard of several cases in which the carbuncle appeared on the leg without any apparent cause other than that the animal was overworked and somewhat debilitated. The class of horses attacked are mainly hard-worked truck horses and heavy-built draught horses; light and well-cared-for horses less frequently. When the carbuncle began the sloughing and gangrene appeared sometimes in two days, and always in three or four. In light and well-bred horses the process was generally confined to one spot, and, after the separation of the slough, recovery was rapid; some being able to work in two days, others in two or three weeks. In heavy and coarse-bred horses the carbuncles were, as a rule, multiple, involving the coronary substance and leg, the sloughing process extending, constitutional disturbance very severe, sometimes causing the death of the animal with all the symptoms of blood-poisoning, and the process involving the tendons, ligaments and fuscia of the part, or the hoof, to such an extent as to render the animal useless and make it necessary to kill it.

The discharge from the ulcers left by the separation of the sloughs is of the most offensive character, and in severe cases is mixed with blood and the remains of the cast-off tissues.

When first called to see the case it may resemble one of ordinary severe scratches, but the pain on manipulation is very intense and parts moist and soft, not hard and "gummy," as in scratches; as soon as the sloughing and discharge set in all doubt ceases. If the coronary band is involved no difficulty of diagnosis is met with.

Prognosis.—Favorable in light, well-bred horses, and in all those where the carbuncle is single and not near the coronary band, recovery in from one to six weeks, accordto the rapidity of the healing of the ulcer. In coarse-bred and heavy horses, the prognosis is always grave, especially if the constitutional disturbance is severe. Their recovery is always slow, and if they once give up and lie down, they don't get up again.

Treatment.—Poultices to the part, frequently changed, irrigation with solution of corrosive sublimate, 1–1000. Some anti septic ointment should be spread around the coronet to keep the discharge from adhering. Give as much nutritious food as possible. An ounce of quinine will often work wonders, given well dissolved in water with a little sulphuric acid. It is sometimes necessary to use slings. After the sloughs separate, the ulcers have to be well stimulated with nitrate of silver, before they show any signs of healing.

ART. XXXIII.—KAMRI, OR PARAPLEGIA.

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The word "*kamri*" is derived from the Persian word *kamer*, which signifies the loins; kamri, therefore, denoting disease of the loins. A somewhat similar disease in man is called "ardhang," or more literally "adhangi," *adha* meaning half, *ăng* body, *i.e.*, having the use of half the body, or affecting half the body only.

Etiology.—Kamri may be brought on (1) from exposure to damp and inclement weather; (2) by dietetic causes; (3) by surgical conditions; (4) and it may be a result of many specific fevers, especially one form of anthrax, rabies, surra, kâkke, and other diseases.

(1) Exposure is one of the most frequent causes of kamri in India. It has been generally noted that picketing horses outside their stables for a single night, will often suffice to bring on an attack of kamri. This is especially remarked during damp seasons, and is explained on the "chill theory," according to which the nervous system, in endeavoring to adapt itself to the needs of the body, exposed to the great and violent changes of temperature said to occur during certain seasons in India, breaks down and becomes disorganized; that is to say, kamri is essentially a disease of the nervous system caused by exposure to climatic changes. Chill is probably a wrong term to use, for the breakdown is nearly as often occasioned by exposure to excessive heat as to excessive cold; and considering that we know practically nothing of what occurs in the body when exposed to a temperature above its own, the theory cannot be summarily rejected. From a large number

of observations made by the writer in these cases, it has seemed, first, that the changes of temperature in certain seasons are sudden and violent; and, secondly, that the connection between these variations of temperature and perhaps the malarious character of localities in which they are often observed is such as to lead to the conclusion that if not in themselves the cause of the disease, they undoubtedly have a most intimate connection with it and suggest precautionary measures in localities where kamri is most frequent. Much may, indeed, be done in all cases by avoiding exposure to the above-mentioned extreme variations of temperature, and by the maintenance of "tone" in the nervous system. As a rule, most cases occur towards the close of the rainy season, and during the winter, only a few cases appearing in the hot months. Enzootic visitations are quite exceptional, and in none of these is fever-height indicative of a specific origin—in fact, one peculiarity of this disease is the absence of any febrile symptoms, the patients maintaining their appetite throughout and showing no signs of illness, save the peculiarity of gait noticed in these cases.

(2) There are also certain dietetic causes in operation which produce kamri both in horses and in men, and which have been proved sufficient to induce this disease when experimentally given to animals, or taken by human beings, as food. A variety of Indian pulse, which is found to be identical with the *Lathyrus sativus*, and known as the kussari, is fraudulently mixed with grain sold in the bazaars in India, and is a frequent cause of paralysis in horses when eaten in sufficiently large quantity to have effect. It is grown as a cold-weather crop on land which will raise no other kind of pulse—chiefly clayey soils and land submerged in the rainy season, which hardens during the cold weather almost to the consistency of stone and splits up into long, deep fissures. It occasionally grows in rice-fields whilst the rice stubble is still standing. Chemically it is exceptionally rich in nitrogenous constituents, and this may account for its tendency to produce paralysis.

(3) Surgical Conditions.—(*a*) *Reflex Kamri.*—Clinical

observation teaches us that not merely motory impressions, but those also which cause sensations, may be reflected; so that the impression of one part is experienced by sensation in another. Impressions on the ultimate distribution of one nerve produce sensations in parts supplied by another nerve, or by another branch of the same nerve. Thus in shoulder lameness, due to disease of the liver and in lameness behind, due to renal and cystic disease, calculi, etc., the sensations cannot be referred to direct nervous communication, but to an influence reflected, probably from the spinal centre only. In intestinal concretions, and in acute colic in the lower animals, we are familiar with lameness from pain reflected to the extremities. Experimental facts show that there are reflex inhibitory centres in the cord. We are acquainted with nerves whose action consists in the inhibition of the action of other nerves; and so pathologists have been induced to look upon reflex paralysis and reflex inhibition as very similar processes. (*b*) *Traumatic Kamri.*—Kamri is sometimes produced in its worst form from injury to the spine.

(4) Symptoms resembling those of ordinary kamri may be seen accompanying the course of certain specific diseases, but especially that of anthrax, rabies, surra, and other diseases. We may consider these *seriatim:*—(*a*) We are familiar with a form of paralysis of the hinder quarters, which occurs in cases of rabies in the horse, but especially toward the latter stages of that malady; and this form of the disease simulates kamri in the horse when the history of the case is not known. Diagnosis is generally easy when we have the previous history of the case, and when other symptoms, absent in kamri, have been remarked in the case preceding the paralysis. (*b*) One form of anthrax, attended with paralysis of the hind quarters, may be mistaken for kamri, but is distinguishable from it by (1) the course of the disease; (2) the concomitant symptoms of anthrax, which are never witnessed in kamri; and (3) the presence of the *bacillus anthracis* in the blood and other tissues of the patient.

(*c*) Dr. Wallace Taylor made the observation, in 1880, that outbreaks of "beri-beri" in man were frequently associated with outbreaks of paralysis in animals—but especially in ponies and mules in Burmah, China and adjoining countries—and that this disease of animals had a pathological relation to that seen in human beings, in that the blood of affected animals showed, on examination, the same organisms—*bacilli*—as Dr. Taylor had described in "beri-beri" of man. The subject of beri-beri has attracted considerable attention in India and elsewhere, and every day new and hitherto imperfectly understood diseases are coming under its nomenclature. Sir J. Fayner even suggests that pernicious anæmia is probably the same disease in Europe. Cases of œdema of obscure origin, as well as other diseases so often met with in practice in India, might also be shown to be but different forms of beri-beri. One fact is noteworthy in Dr. Taylor's account, namely, change of situation and climate always brings about an improvement in these cases; and this fact has been noted also in animals, as Dr. Taylor mentions both an acute and a chronic form of paralysis, and it is the latter cases which benefit mostly by a change of situation. (*d*) Veterinary Surgeon Steel noted in the Burmah outbreak, which he was deputed to investigate in 1884, that paralysis of the hinder quarters was remarked in many cases of that disease in mules; and he has since seen the same disease in animals at Poonah, where this symptom of paralysis was seldom absent.

Diagnosis.—I think the etiology of the disease shows that the subject of kamri in the horse—whether true or symptomatic kamri—is at once wide and interesting, and therefore worthy of our closest consideration. We must not, however, confound the simple forms of kamri with those due to specific causes, which are readily distinguishable by the course and concomitant symptoms, the presence of the specific organisms in the blood and other tissues; the influence of treatment, etc. The paraplegia accompanying the course of specific fevers—anthrax, rabies, surra, etc—is not a *neurosis*, but is without doubt symptomatic, arising from reflex irritation of some remote disturbance, in this instance probably some blood-vascular derangement of congestive character. It is obvious that the spinal cord being a complex organ, any reflex irritation arising from it would be more or less generally manifested, thus explaining the posterior paralysis sometimes noted in the course of these diseases. It is generally transient in character, of varying degrees of severity, and usually passes off on the disappearance of the other symptoms common to the disease. The paralysis in kamri comes on quite independently of any febrile disturbance, and always runs a prolonged course, the symptoms lasting for many months or even years. In fact, general belief stamps the disease to be, as a rule, incurable through life; hence all animals affected with kamri, in the old stud days, were sold by public auction, as unfit for the service. The specific fevers in which paralytic spmptoms are noted, are contagious and enzootic, while kamri proper is not.

Symptoms.—A horse affected with kamri stands in the stall with his hind legs under him, *i.e.*, places them somewhat forward under the belly and parallel to each other, instead of one leg before the other as in health. He changes his position now and then, and again stands as above mentioned. In backing he does so with difficulty, and drags his hind legs under him, and, if any force is used, even sometimes goes down on his haunches. In trotting he has a rolling action behind, and the hind legs swing from side to side, especially in going up or down hill, which is noticeable from the hips downwards. In turning at a trot on the left, the animal swings the off hind leg outwards, and the near hind leg when turning on the right side. Some severe cases have a difficulty in rising in the stall, and, except in cases of kamri from injury, they evince no pain on pressure to the loins. These are the symptoms met with in ordinary kamri, and in ninety-nine per cent. of the cases seen; the more acute symptoms of paralysis being referable chiefly to those of a specific origin, or to neglect of treatment in the early stages of the simple cases.

Prognosis.—I think that it may be stated generally that a person should not purchase a horse for at least twelve months after amelioration of the acute symptoms, and that he ought not to do so whilst any weakness in the animal's action is noticed, whatever time has elapsed since apparent recovery. The prognosis is more hopeful in young than in very old animals.

Treatment.—This should be both curative and preventive in kind. The treatment which is found most efficacious in practice is the internal administration of nux vomica, commencing with 20 gr. doses, and gradually increasing the amount to two drachms each dose, given twice daily till improvement is noticed. In some cases the iodide of potassium will be found beneficial, with iron and other tonics. It is always well to administer a physic previous to commencing the treatment by more specific agents. When symptoms simulating those of kamri proper follow in the course of any specific fever, the same treatment will be indicated as is found beneficial in the management of that particular fever; we must, in fact, treat the disease, and not the symptom, in this instance.

Pathological Anatomy.—There are two kinds of changes of the cord principally associated with cases of kamri; the atrophic and the hydræmic or œdematous, which may be found in varying degrees of severity in different cases, depending on the stage of the disease at which the *post-mortem* examination is made. The above changes are, doubtless, of secondary origin, the result of the disturbance of function, and afford no indication of the morbid influence by which the function is disturbed. The one almost solitary fact which we have to guide us in seeking for the seat of the disease is the change in the irritability of the motor nerves of the hinder quarters. This proves beyond a doubt that the nutrition of these nerves is changed. But such a change in the nerves suggests a similar in the motor nerve-cells of the spinal cord. Of these the motor axis-cylinders are the processes, and share the changes in nutrition of the parent cell. Moreover, the loss of power, or paralysis itself, indicates that there is a morbid state of the gray matter, since we know that only nerve-cells can liberate the energy which causes motor power. We may feel sure, therefore, that the motor nerve-cells of the cord and the fibres proceeding from them are in a morbid state. But here we must stop. Whether the morbid condition arises primarily in the cord, or descends from higher centres, we cannot tell; and opinions which may be given, that this or that part of the brain is the seat of the disease, would belong, in the present state of our knowledge, to the region of unsupported theory. We are not justified in going for the seat of the disease beyond the spinal axis, including the grey matter of the pons and medulla, in which a morbid state is undoubtedly indicated. Of the nature of the change in the nerves and their centres we know almost nothing. The enduring alteration in function proves some change in their nutrition; but the fact that this change remains limited to weakened power, and frequently passes away entirely or becomes greatly improved under appropriate treatment, proves that it is comparatively slight in degree, and probably limited to such fine molecular changes as could not be recognized by any means of investigation at present at our disposal. The functional alteration in the motor nerves is at present the only pathological indication we possess. But functional disturbance in the nervous system often indicates vasomotor disturbance. The vasomotor symptoms, therefore, that are now and then witnessed in some cases, are clearly secondary in time; and we are not justified in assuming that they are in any way a special feature of the disease. So also the leucocytal aggregation about the vessels, engorgement of them, etc., which have been noted in a few severe cases, are slight and variable traces of similar disturbances in the spinal cord.

EDITORIAL DEPARTMENT.

THE REPORT OF THE ENGLISH COMMISSION ON THE PASTEUR METHOD.

A CRITICISM. BY E. C. SPITZKA, M. D.

In its issue of July 2d, the *British Medical Journal* editorially exclaims that the report of the British Hydrophobia Commission, while "not a lengthy document, in a comparatively few paragraphs affords the most complete and powerful defense of M. Pasteur's method, and the most crushing reply to his critics yet published." We confess that our curiosity was aroused by this announcement. Truly it must be as able and thorough as it is a laconic report which could vindicate M. Pasteur and crush his critics satisfactorily, for in this M. Pasteur signally failed himself, as we shall show hereinafter. We have thoroughly analyzed the report to which the *British Medical Journal* refers, and regret to be compelled to admit that it is precisely as unsatisfactory and unconvincing as M. Pasteur's notoriously inconsistent pronunciamentos. Indeed, it is not necessary to go beyond the editorial in question to show this. We reproduce the following, *verbatim :*

"The report also deals with the question raised mainly by v. Frisch in Vienna and Lutand in Paris, whether the inoculations of Pasteur may not themselves be responsible for the deaths of some of his patients. The Committee is of opinion that there is no evidence that any deaths have been caused by the first or ordinary method, but that since the "intensive" method has been used deaths have occurred under conditions which have suggested that they *were due to the inoculations* rather than to the infection from the rabid animal. The case of the man Goffi, an attendant at the Brown Institute, who was bitten on September 4th, was placed under M. Pasteur's care on the following day, but died on October 19th from acute ascending (motor) paralysis in St. Thomas' Hospital, *rather tends to confirm this fear, for Mr. Horsley has found that he died of hydrophobia.* The report favors the assumption that Goffi *died of the virus of the cat by which he was bitten,* chiefly on the ground that the period of incubation was longer than would have followed the inoculation of virus of the highest intensity. This statement, however, appears to go near to begging the whole question, for the matter in dispute is the behavior of the "intensive virus" in man, and a most important element is the duration of incubation. The unusual nature of the symptoms also requires explanation, for the suggestion that the cases hitherto described under the term "acute ascending paralysis," or Landry's paralysis, are in many instances examples of the dumb or paralytic form of rabies in man, rests upon this single observation of Mr. Horsley's, and ignores the fact that a large proportion of such cases recover. That M. Pasteur himself shares to some extent the apprehensions which have been expressed is shown by the fact that he has already modified his intensive method; instead of using a whole series of fourteen cords, from fourteen days to one day old, during the short period of seven days, followed by six other injections on the four following days, again ending with a cord only dried for one day, he over-spreads the injections over fifteen days, and the most virulent cord used has been dried for five days."

We do most respectfully submit, that neither the British Hydrophobia Commission nor the *British Medical Journal's* editorial staff are clear in their own minds, either as to what rabies is, what Pasteur has done, *or what their own words mean!* It is a striking illustration of what we have seen elsewhere adverted to that in no department of thought are medical observers so deficient as in logic. Let us study the alternative presented, leaving out of consideration the fact that the report is self-contradictory as to the cause of the death of Goffi. If it were true that Goffi died from the bite of a cat, as the British Hydrophobia commission claims, would that not be the most positive condemnation of Pasteur's procedure, demonstrating *the utter valuelessness* of his intensive method? Goffi was inoculated by this intensive method under the most favorable auspices, the day after he was bitten. He died. If the intensive method could not save his life—if Pasteur acknowledges that his milder method was not sufficiently protective, what value are we to attribute to his intermediate method?

We refer to this branch of the report in order to show our readers on what hollow presumptions and careless theorizing that minority of English physicians who sustain Pasteur, base their conclusions. The commission includes the names of many prominent scientists, among them the distinguished veterinarian Fleming. But it does not appear that the slightest attempt was made to analyze and weigh the clinical evidences of real or spurious rabies in the animals experimented on. The whole matter seems to have been left in the hands of Mr. Victor Horsley, the Secretary, whose ability to discriminate in any matter involving the use of judgment and well-balanced reasoning, we need no other comment on, than the *British Medical Journal's* admission that he cannot distinguish between Landry's paralysis—a well-recognized and recoverable form of nervous disease in man—and rabies.

We should cover this humiliating admission regarding Mr. Horsley, with the mantle of charitable silence, but unfortunately he has shown what in American politics is called "offensive partisanship," in his letters in the *British Medical Journal*, too prominently to deserve much mercy at the hands of others. When a respectful request was made of him to answer certain questions relating to the symptoms of rabbit rabies, he sneeringly referred the questioner to M. Pasteur, and dictatorially declared that no one had a right to question M. Pasteur's results.

It will thus be seen that while the report of the Hydrophobia Commission is calculated to foster the Pasteur agitation and to keep up the rabies craze, it cannot, even after a very superficial perusal weigh as a feather in the balance in favor of the enthusiastic would-be-Jenner of Paris. Other competent, and it seems to us more careful and thorough, investigators have come to very different conclusions. We cite the following from the *Medical and Surgical Reporter* of July 9th.

> The Belgian Government, in consequence of requests made in the Chamber of Deputies, lately deputed three Belgian physicians residing in Paris—Drs. Grandjeau, DeBrun and Peeters—to investigate and report on M. Pasteur's method of preventive treatment of hydrophobia, and to decide upon the advisability of founding a Pasteur Institute in Belgium. The report of these gentlemen, as the Chamber has just been informed, is decidedly averse to such a step. It was decided by the reporters that Pasteur's method is not as yet sufficiently established, and one of them, Dr. De Brun, doubted whether there was any efficacy at all in the treatment. In this last view, Van der Corput, 'Belgium's chief specialist,' coincides."

The Austrian Government has withdrawn its subsidy to the Pasteur Institute, and the Emperor of Austria, to plaster up this wound to Pasteur's vanity, has created him a Baron!

No one who has followed up the rapid changes of opinion and practice indulged in by Pasteur, involving at least six different propositions as to the length of time his virus is protective for, and no less than three different "potencies" of virus, but will admit that his experiments with human beings were altogether premature. Indeed Frisch, who, as long as he expressed himself favorably regarding Pasteur's researches, was lauded to the skies by the latter and as violently attacked as soon as he ventured to differ from him, was enabled to practically predict the deaths which followed from the use of the intensive virus, for he found singularly untoward results in dogs. In his attack on Frisch, Pasteur makes the singular admission that the virus Frisch used—although obtained from Pasteur directly—may have changed in character! We think it may have done so; we are quite certain that M. Pasteur's virus has also changed in character—that is, so far as a thing whose origin, nature and destiny are altogether problematical, may be regarded as being a vacillating and uncertain quantity.

It is exceedingly unfortunate that M. Pasteur is so frightfully inaccurate in his citation of what he regards evidence proving him to be a modern Jenner. The great surgeon and pathologist, Billroth, in endorsing Frisch's experimental conclusions, ventured to pronounce Pasteur's protective authrax inoculations a *fiasco*. As Pasteur's reputation on this score rests almost exclusively on the claim which he has loudly urged—that anthrax has been practically exterminated in France by him—he was touched to the quick by this, and in reply said that the Berlin Laboratory, although originally reserved as to the value of the anthrax inoculations, had more recently, after a repeated test of the matter, endorsed him. Frisch made special inquiries to see if this were true,* and found that it was not! The last declaration emanating from that laboratory, based on researches of Koch, Gaffky and Laffler, regarded the anthrax inoculations as of doubtful value. And in digging up the records Frisch came across a statement emanating from the same parliament, whose Hydrophobia commission has now endorsed Pasteur, which is not at all calculated to increase Pasteur's prestige* To those interested in the matter we would urge the perusal of Frisch's reply; it is replete with evidence that Pasteur, unable to meet his adversary squarely on the basis of facts, resorts to evasion and adroit quibbling in attempting to keep up the appearance of a scientific discussion. The latest official statement from Koch of Berlin proves that, to put it mildly, Pasteur relies on his imagination for his facts.

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* Discussions in the Vienna Medical Society of June 11th, 1887. Deutsche medizinische wochenschrift, 1887, p. 559.

Meanwhile, news comes to us of the forty-fifth death after inoculation † in Pasteur's laboratory. Lord Doneraile though bitten through a glove by a vixen and promptly treated by Pasteur, is also dead, while his coachman, bitten by the same animal on the unprotected hand, is alive and well.

To us, on this side of the Atlantic, it seems that one good will come out of this discussion. We are in a fair way to find out what is rabies in the dog. As soon as that question is clinically settled, we will ascertain what is rabies in man. Most of the evidence we are in receipt of is of the negative kind, showing what is *not* rabies in man, the horse and the dog. Of this kind of evidence we append a few samples.

"At Hunter's Point yesterday a report that Otto Nunbeck, aged 9 years, of 114 East Fourth Street, is suffering from hydrophobia. was denied. The physician attending him said the boy was simply suffering from malaria. He was bitten on the upper lip by a neighbor's dog, and though the animal was not and is not mad, the wound was promptly cauterized. The lad suffers considerable pain, and his outcries caused some gossips in the neighborhood to spread the report that the case was one of hydrophobia." ‡

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* An enzootic of Anthrax having broken out in Cheshire, Mr. Gardner, in the Commons, interpellated Lord Manners as to the advisability of introducing Pasteur's protective inoculations in England. The reply was that the control experiments made in England had not furnished sufficiently reliable results to justify its introduction.

† A Spaniard named Ramon, bitten by a wolf on the fifteenth of February. The report does not state whether this was not also, like one of the Russian cases, an instance of bad surgery.

‡ N. Y. *Times*, July 29th, 1887.

The same paper contained the following announcement on March 12th :

Charles Berg, station master at Winfield Station, Long Island, died on Jan. 18 in St. Catherine's Hospital at Williamsburg. Berg was attended by Dr. Combes, of Newtown, who pronounced him to be suffering from hydrophobia, but the physicians at the hospital gave meningitis as the cause of death. Berg was bitten by a dog some months before he died. After the post-mortem examination Dr. Combes still held that it was a case of hydrophobia, while the physicians of the hospital contended that it was not. The case excited considerable interest among the medical fraternity, and some doctors, on learning a history of the case, sided with Dr. Combes. The latter took the spinal cord and brain to Prof. Ira Van Giesen, of the New York College of Physicians and Surgeons, for microscopic examination. Prof. Van Giesen has given in writing the result of the examination, which sustains Dr. Combe's diagnosis.

We wrote to the hospital physicians for a history of the case and received a reply embodying the following, which will possibly indicate to our readers why we suppressed our curiosity as to the new discovery which enabled Professor Van Giesen, if correctly reported, to decide the case to be one of Hydrophobia :

"Patient was admitted to this hospital as a supposed case of hydrophobia, having been bitten by a dog two years previous. On examination patient was found to be in a very excited condition. Temperature and pulse normal, refused to answer questions when spoken to, would not take food or drink. Towards evening patient became violently delirious. Temperature rapidly rose to 108°, face very much flushed and pupils widely dilated. Diagnosis of acute meningitis was made and confirmed by one of the visiting physicians. Patient died the following morning at 4 A. M.

Autopsy * * * * *Brain* congested, fibrin along the vessels, cloudiness in the arachnoid * * * * * *.

AUGUST HOEHLE,
House Surgeon.

A very interesting account is also furnished by Dr. Harbaugh, V. S., of Richmond, Virginia,* concerning the case of Mr. Garnett. This gentleman had been bitten by a mare suffering from œstro-mania. We quote from Dr. Harbaugh's statement :

Mr. G. informed me that one gentleman drove through the country and ordered two dozen or more dogs to be killed for no other reason than that the poor dogs were so unfortunate as to live in the neighborhood visited by the *suspected* dog. The day following the death of the mare, Mr. Garnett's dog and cat acted in a very suspicious manner ; in fact, *had fits !* Now, of course, the state of Mr. G.'s nervous system was in no condition to stand any such nonsense ; he therefore took down his gun and shot them both. This was still further proof, to those already convinced, that the mare was mad; but Mr. G. was one of the first to discover that some officious person had poisoned the dog and cat for fear they would go mad. Among the number of dogs ordered to be killed was one which disputed the right of way with the reprobate dog in question; a rough-and-tumble fight ensued, during which the reprobate dog literally "tore" the disputant dog, lacerated him, and laid him up for repairs. This dog now became "a suspect," but the owner refused to kill him. However, he was confined and closely watched, and has made a good recovery from his late indisposition, without any suspicious symptoms that I am aware of.

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* Virginia Medical Monthly, July, 1887.

Running at the mare's side was her four-months-old colt, and the poor little colt also came in for its share of suspicion, and for weeks after was "a suspect." (I believe Mr. G. was advised to kill the colt.) The colt is now growing up to be a fine animal, and has never shown any symptons that indicated that universal specific for hydrophobia in the lower animals—the gun.

Now, when these animals were suspected and watched so closely, how much more carefully do you suppose Mr. G. was watched? Some of his best customers did not go to his store for some time, and some of those that did visit him were very careful not to excite him, while others felt safer when the counter was between them and Mr. Garnett.

We are happy to be able to state that the sensible procedures adopted by Dr. Harbaugh prevented a pseudo-lyssa in Mr. Garnett, who is doing well. Considerable excitement was created by the Haverstraw case. The diagnosis of rabies was confirmed by Dr. Wm. A. Hammond. It appears that the patient, while attempting to extract a foreign body from a pet dog's throat, was "nipped." His arm rapidly swelled up; intense pain followed. The physicians, according to the newspaper account, gave him chloroform and morphine, and in this condition he was judiciously informed that he would die in a short time. He died of blood-poisoning.

Another case is reported from Chicago. An editor of the chief medical monthly of that city made inquiry on our behalf and reports:

> "The child snapped and howled during paroxysm, no evidence of hydrophobia in dog, nervous family, hydrophobia town talk for weeks before. The case was probably one of simple tetanus."

In view of the conflicting views as to the clinical character of rabies in man, we must insist that those who have opportunities for studying rabies in the dog, furnish us with better criteria than J. Wortley Axe in the *Veterinarian* of January, 1886. He states that if the stomach is void of food, and contains foreign matter, there is good ground for suspecting rabies. It is this same criterion which Mr. Victor Horsley used, and we are not surprised to find him, as well as the Hydrophobic Commission which entrusted its work to him, misled. No tyro in veterinary pathology but knows a dozen complaints in which the same condition is found. Nor are we satisfied with "the peculiar howl" which, on somewhat sounder grounds, is regarded as the characteristic peculiarity of a mad dog. Rost* says: "A dog which bites at all living objects and attacks his own master without provocation, is always to be regarded with suspicion and quarantined." This seems to us to besound, but it were well if we had some safe and reliable sign warning us of danger before the biting period comes on.

There is something mysterious about tetanic affections and other parasitic diseases of the nerve-centers, which may or may not bear on the possibility of a prolonged incubation of the various diseases which are confounded under the term rabies. Thus Cheesman† reports a case of traumatic tetanus, recovered from, and yet followed eight months later by tetanoid symptoms provoked by vaccination. We have ourselves, in a pure, uncomplicated case of epidemic cerebro-spinal meningitis, in a girl of thirteen, completely recovered from, seen a relapse of the opisthotomes, apparently brought on by the heat. All these and a host of similar facts indicate the necessity of renewed study of the entire subject. They point in this direction, that rabies is a collective name, indicating mental motor and sensory symptoms in the dog, which may be due to meningitis, insolation, acute delirium, typhoid fever, tetanus and perhaps an unknown disease. There is nothing surprising in the transmissibility by biting of some of these affections. But how rarely must this occur when there is not a single authentic case of a transmission of so-called rabies that cannot be accounted for either on the blood-poisoning or tetanus theory, in the whole domain of the United States, in two years?

After all the problems suggested in the foregoing are solved, it may occur to some one to examine into the question: What do the victims of M. Pasteur's method really die of? In the case of Dr. A. Stoboi, a Russian physician, who died after having been subjected to the Pasteur treatment, the dog that bit him being still alive,* the disease is pronounced as "dumb rabies." Similar symptoms were found in the other cases dying in England and France.† They closely resemble that "rabbit rabies" which M. Pasteur produced in his laboratory, and which Daremberg has imitated by using ordinary septic matter, thus repeating and confirming the results obtained by the writer.

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* Quoted in *Fortschictte fur Medizin*, p. 783, 1886.
† Medical Record, May 8, 1886.

With regard to the Pasteur institutes sporadically springing up in various parts of the world, they do not appear to be founded by those having the confidence of the best medical men in the community where they reside. A grave, ethical offense is charged in the *Virginia Medical Monthly* against the managers of the New York Pasteur Institute, which still has a nominal existence. A similar institution in Italy is denounced as a swindle‡ by Bordoni and Uffriduzzi, and has since vanished into the nothingness from which it sprang. More recently the New York Dog Pound was selected as the site of another Pasteur institute by an enthusiastic Hungarian chemist, but before the first inoculation could be carried out the agents of the Society for the Prevention of Cruelty to Animals interfered, and as the experimenter was unable to show any medical authority for his undertaking, he was cruelly choked off.

We expect at no distant date to present papers by two of our contributors, throwing light on certain experimental and clinical facts related to these questions.

DENTIGEROUS GROWTH.—We beg to call the attention of our readers to the case reported by Dr. A. H. Logan, in which he describes an operation performed by him on the horse, namely, the extirpation of a cystic tumor from the facial sinus, which was found to contain 400 teeth; also to the article by Dr. J. Bland Sutton, on Teratomata, giving a clear description of the various tumors, in whose cysts are contained bodies so dissimilar in their nature.

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* The Medical Standard, April, 1887.

† Paris Biological Society. British Medical Journal, p. 133, 1887, Vol. I

‡ Riforma medico, January 19, 1887.

These articles have mutual bearings. They show how the pathologist by his labors in the laboratory helps the practitioner in his practice, explaining to him the otherwise unaccountable phenomena which he encounters, whilst the latter, by reporting his case, affords the former food for thought and enables him to give practical demonstration of his scientific theories. C.

EQUINE SPINAL MENINGITIS.—It seems that this disease is now prevailing in New Jersey, and, as will be seen by the cases reported by Dr. Frey, it is evidently assuming the epidemic form in New York also. This is serious enough in itself, but how much more so when we consider the danger to human beings.

An authority who has made the subject a life-long study is of the opinion that we are on the eve of a great outbreak of this disease, similar to one fifteen years ago. He considers the principal cause to be dampness, filth and ill-ventilation, while a possible factor in its causation is bad food, such as mouldy grain, etc. He dwells on the importance of preventive measures—clean stables, well disinfected and the avoidance of manure pits.

It is then the duty of every Veterinarian to give this matter careful attention and to do all in his power to prevent the epidemic, or its extension if it should occur.

C.

NOTES.—We are pleased to inform our readers that Dr. R. S. Huidekoper has lately received the appointment of Honorary Foreign Associate of the Royal College of Veterinary Surgeons, London.

We have received the advanced slips of the proceedings of the ninth International Medical Congress, held at Washington September 5-10, through the courtesy of Messrs. William Wood & Company, Publishers of the

Medical Record, a weekly journal of medicine and surgery published in New York City.

We beg to call the attention of our readers to the paper by Prof. Walley on colic diseases. It is written as an introductory to another paper, which will be devoted to the most important subject connected with the colon, viz.: displacement, torsion, etc., a subject to which he has devoted much thought and many years of study, and but little understood by the great bulk of the members of the veterinary profession.

CASE DEPARTMENT.

I. **Dentigerous Growths.**—On May 1st I was called to see a sorrel mare, four years old, that was supposed to have big head (*Osteo Porosis*).

On examination I found the bones over the region of the superior maxillary sinus considerably distended, dull sound on percussion, discharge from the left nostril, breathing on that side considerably affected, gradually losing flesh, although she had an inordinate appetite. An examination of the mouth showed no disease of the molar teeth. I had no hesitation in diagnosing it a disease of the facial sinus, but of what character I could not say. I recommended trephining and removing the foreign substance, to which the owner consented.

I threw and secured the patient. After removing a circular portion of skin and the areolar tissue from over the lower third of the enlargement, and trephined into what was once the superior maxillary sinus, I was astonished to find the place filled with a substance resembling petrified worms, but on closer examination they proved to be teeth. They were enclosed in, and attached to a special membrane, which was vascular and slightly sensitive, and appeared to have the power of producing them.

They were not very firmly attached to the membrane, as I removed the majority of them with my fingers, the rest with a Wolf tooth forceps, as it was the only forceps I had with me. After removing the teeth, I removed the membrane, which was also completely filled with the deposits, being about the size of a millet seed or smaller.

The largest tooth removed was about the size of one's thumb, and an inch and a half long, Their outer structure was very porous and composed of lime; the inner structure was more dense and solid. The points (crown) of several of them were covered with a hard substance resembling enamel. This may appear incredible to some of your readers, but if they had to remove them as I had, they would be convinced of its reality before they were through. On actual count, after the operation, there were 400 teeth, not counting the smaller ones attached to the membrane.

The after treatment consisted in dressing the wound every day with carbolic lotion 1-40, which was still weakened to 1-60. The wound healed up nicely, and the enlargement on the face is gradually disappearing. A. H. Logan, V.S.

Belfontaine. Ohio.

II. Nasal Polypus.—On the 11th of April of this year a bay mare, aged 8, was brought to my infirmary for examination.

The principal symptom presented was inability to move fast. A distance of twenty or thirty yards was all she could do without danger of going down, apparently from deficient power of respiration.

On examination I found the right nostril closed so that no air passed through, the left also being occluded to a great extent.

The following day I had the animal cast. I then trephined, and found on the right side that the chamber was completely filled with what appeared to be a mass of white fibrous tissue, broken down in places into what resembled pus. By enlarging the opening downwards from the frontal bone for a length of three inches, I found that the growth had not only filled the cavity on the right side, but had so pressed upon the septum nasi as to deflect it greatly over towards the left, thus partly filling up the left chamber.

Evidently, if the right chamber could be cleared, the septum would regain the normal position, to some extent at least, the left chamber being thus enlarged.

I did not wish, however, to attempt a cutting operation in this case, and that for several reasons. I therefore determined to attempt the removal of the neoplasm by medicinal means. I first tried sulphate of copper, but this had no effect. I then combined arsenious acid, one part, with pulverized cupri-sulphas, two parts, and applied this mixture freely.

On examining the tumor the second day after, several portions could be removed. Continuing this treatment, applying the mixture every second day, at the end of sixteen days the nasal chamber was apparently cleared of the growth, it having all sloughed away. Still, however, the hard breathing continued. On the eighteenth (18th) day of treatment I was able to see back into the pharynx, through the chamber. I saw that there was some foreign body lying in the posterior nares. Not knowing what I had got to deal with, I seized the object with a long wire hook, and firmly drew it forward. Gentle yet firm traction was required, when ultimately a tumor dropped into the chamber from which it was easily removed, as its point of attachment to the posterior part of the septum had been torn through. No sooner had this mass been removed than the breathing of the animal was completely relieved.

The polypus measured six inches in length, four inches in circumference, and appeared to be formed of white fibrous tissue. I have preserved the specimen. The cause of the hard breathing was now evident. It had not been wholly due to occlusion of the nasal chambers. The polypus, protruding into the pharynx, and pressing on the epiglottis, had principally produced this condition. Further treatment was simple, and consisted of the use of astringent and healing remedies. Recovery was rapid, the wounds soon healed, and the mare is now doing her usual work every day.

Seville, Ohio. J. H. MILLER, V. S.

III. SPINAL MENINGITIS IN HORSES.—On Wednesday afternoon at 1 P. M., August 24th, I was called to see a horse apparently suffering from laminitis; the history I obtained from the owner being as follows: On the morning of the same day the animal left the stable in Elizabeth street attached to a heavy cracker wagon on its usual route to Harlem. While the driver was unloading, a heavy rain set in and the horse became thoroughly drenched. After the shower had subsided he was taken back to the stable at about 10.30 A. M., feeling as well as ever, only a little exhausted from the drive. At noon, just as the groom was about to feed it, he noticed that the animal acted as if nailed to the floor, and arrived at the conclusion that the horse was "foundered," as he told the owner, who immediately telephoned me.

Two hours later I arrived at the stable and after a careful examination noted the following symptoms: Membranes congested; pulse very weak; temperature normal; prolonged inspiration; shortened expiration; ears and extremities cold and a general rigidity of all the muscles. After frequent attempts to move the animal I found it to be impossible, as he evinced intense pain upon every effort.

I admit that I was at a loss as to the nature of the trouble and determined to treat the symptoms. I administered stimulants and anodynes, but the stimulants seemed to have no effect, as I noticed the pulse becoming weaker and weaker. At about 3.30 o'clock the animal began to stagger and showed signs of paralysis; slings were immediately procured and put in use, but as soon as they were put on he threw his entire weight in them with the fore feet entirely off the ground. I saw they were of no use and that he was suffering more in that condition, and ordered him to be lowered to the floor and the slings removed. I then noticed a complete loss of power in the hind extremities and that he appeared to be choking. He made one or two efforts to eat some oats which were lying on the stable floor but at any attempt to swallow would groan and look to his flank. Hyperdermic injections of strychnia were used, more stimulants were administered, and at 4.30 he died in apparent agony; cause, failure of the heart's action.

At 7:30 A. M. on the next morning, Thursday, I was again called to the same stable and there found another case almost similar. Before slings could be used the animal was dead.

On the same day, in the same stable, a third case occurred exactly as the first. A plan of treatment was adopted as indicated by the symptoms. Five hours after, the horse died.

On Friday of the same week I was again called to the same place but almost too late to administer any remedies as the animal died just five minutes after my arrival.

On Sunday I was again sent for and informed that another horse was down and seemed to act similar to the others.

Other Veterinary surgeons were called in consultation and arrived at the conclusion, as I had, that the animal was suffering from spinal meningitis. My plan of treatment was laid out to them, which was approved, and we all arrived at the conclusion that the disease was necessarily fatal. The fifth animal died at 4 P. M. on the same day.

During the first three days of the days of the disease, six more cases in the upper part of the city came under my charge but all with the same result. The only difference in the symptoms being the elevation of the temperature, ranging from 101½° to 106½°. The actual cautery over the spine was applied in some cases, as was also physicing. Up to September 1st, twenty-three cases, all in different parts of the city, have been under my care, and about as many more I have heard of through others.

I have read of the disease throughout New Jersey taking the form of cerebro spinal meningitis, but in no instance have I noticed any brain affection.

I will state here that after the first horse died the owner had the stalls thoroughly disinfected, he believing the disease to be contagious. As it has appeared in isolated cases I am inclined to think it infectious rather than contagious.

MARK L. FREY, D. V. S.
New York City.

STATISTICS OF HOSPITALS AND OUT-PATIENT SERVICE.

VETERINARY DEPARTMENT. UNIVERSITY OF PENNSYLVANIA,
September 1st, 1886, to September 1st. 1887.

	Hospital.	Out Patient.		Hospital.	Out Patient.
Abscess	4	14	Bronchitis	1	10
Amputation. Legs dog		3	" Chronic	1	4
" Tails dog		3	Bruised feet	5	6
" Tails horse	10		Bursa	1	8
Anæmia	4	3	Calculi. Vesical	1	1
Anarsarca	8	4	" Of penis	1	2
Arthritis	1	1	Canker	3	5
Atrophy. Muscular		2	Caries. Sup. Maxillary	1	2

	Hospital.	Out Patient.
Castration	4	10
Cataract	8	8
Catarrh. Auricular	10	11
Champignon	1	8
Chorea	5	6
Cicatrix. Painful	1	1
Collar boil		1
Collection of sinuses	6	8
Congestion. Cerebral	1	
“ of liver		2
“ of lung	4	
“ of spine	6	
Conjuuctivitis	1	8
Constipation		10
Contracted heels	6	35
Contraction of flexor tendons	4	2
Contusions	3	5
Convulsions	5	2
Corns	3	15
“ Suppurating	1	2
Crapaudine	2	1
Curb	3	7
Cyst. Anus	1	
“ Mucous	2	
“ Serous		2
“ Testicles	1	
Cystitis	1	
Degeneration. Fatty liver.	1	
“ Flexor tendons	1	
Diarrhœa	2	3
Dislocations. Femoral articulation	1	2
Dislocations. Eye		1
Distemper. Dogs	20	17
Dropsy. Abdominal		2
Dysentery		1
Ears. Cut		1
Eczema	17	19
Emphysema	1	5
Endocarditis. Mitral	8	3
Enterititis	5	2
Epilepsy		1
Erythema		3
Eyes. Removed		2
“ Artificial supplied		1
Examination for soundness.	1	57
Examination	8	1
Filaria. Hæmtooza	1	
Fistula. Parotid	1	
“ 2d Phalanx	1	1
“ Withers	8	3
Fleas		1
Foreign Bodies. Bone in throat		1
Foreign Bodies. In maxilla		1

	Hospital.	Out Patient
Foreign Bodies. In rectum.		1
Fractures. Femur	2	3
“ Humerus	1	3
“ Nasal bone	2	2
“ Pelvis		2
“ Phalanx	1	
“ Radius	3	3
“ Ribs	2	
“ Tibia	9	8
“ Vertebræ	1	
Founder	7	1
“ Chronic	2	
Gastritis	2	7
Gastro enteritis	1	
Glanders		12
Goitre	1	1
Grease	6	8
Growth. Fungus		1
Hæmaturia		1
Helminths. Ascaridies	1	15
“ Tænia	2	4
Hemorrhage	1	
Hoof deformed	1	2
Hydrophobia	2	
“ Suspected	1	
Hysteria	1	1
Impaction of rectum	2	2
Inanition	1	
Indigestion. Chronic	2	9
“ Intestinal	2	16
Injury. Maxilla	1	
Influenza	4	11
Ingrowing nails		2
Interfering		4
Iritis		2
Keratitis		8
Knuckling		1
Laryngitis		4
“ Chronic		1
Leucocythæmia		1
Locomotor ataxia	1	
Luxation. Scapula humeral	1	
“ Eye	1	3
Mange Sarcoptic	17	30
“ Dematodect		2
Marasmus		1
Meningitis. Cerebro spinal	4	
Navicular disease	5	4
Necrosis		2
Neuritis. Rheumatic	1	
Old age		1
Opthalmia. Periodic	1	8
“ Traumatic		3
Osselet		3
Osteo Porosus	2	2
Ostitis		1
Paralysis	2	3

	Hospital.	Out Patient.
Paralysis Lumbar. Dog...	2	
Paraphlegia	1	
Paronychia		1
Pneumonia	13	2
“ Chronic	1	
Periostitis	5	7
Peritonitis	1	1
Pharyngitis		1
Pleurisy	1	
Poisoning	1	
Poll evil	1	
Pricked foot	5	10
Prolapsus. Rectum	1	
“ Uterus	3	1
Prostrate enlarged	1	1
Quarter crack	1	7
Quittor	9	24
Rachitis	2	
Rheumatism	8	4
Ringbone	11	15
Roaring	3	7
Rupture. Muscular	1	1
Shoe boil	2	3
Shoeing		493
Sidebone	3	1
Spavin	13	38
Spayed. Bitches	10	4
Splints	6	8
Sprain of knee		1
Strain of fetlock		1
“ Suspensory		1
“ Ligaments	1	
“ Muscles	1	
Sunstroke		2
Suppurating sole	1	
Surfeit		1
Stumbling		1
Synovitis. Carpal sheath..	1	7
“ Great sesamoid sheath	2	5
Synovitis. Tibio tarsal	1	1
“ Rheumatic	1	
Taenia	1	8
Tetanus	7	
Teeth. Filed		37
“ Irregular operated		7
“ Removed		4
Toe crack	5	8
Thrush	7	10
Tuberculosis	2	7
Tumors. Carcinoma	1	2
“ Epithelioma	5	6
“ Fibroma	2	3
“ Lypoma		1
“ Lymphdenoma...		1
“ Melanotic		3
“ “ Sarcoma		1
“ Myxoma		1
“ Papiloma		1
“ Sarcoma	4	2
“ Sebaceous		1
Ulcers	4	10
“ Chronic	1	
Urticaria		4
Vertigo		1
Wounds. Incised	4	2
“ Lacerated	7	13
Total	429	1298

PROCEEDINGS VETERINARY MEDICAL SOCIETIES.

I. New Jersey State Veterinary Society.—Twenty-four *graduates*, fifteen of whom had been members of the old association, have assisted in organizing a NEW JERSEY STATE VETERINARY SOCIETY to which *only graduates, in good standing, from some Veterinary College or University having power by law to grant diplomas, are eligible to membership.* Every graduate known in the State was duly notified of the action about to be taken and a meeting was held August 4th, 1887, at the office of Dr. William Herbert Lowe in Patterson, New Jersey, where officers were elected and the organization completed. The society proceeded immediately to comply with the term and provisions of the act of the Legislature for the promotion of veterinary science and art. The officers and members present signed and sealed the certificate of incorporation which had been previously drawn up by Senator Griggs, after which the document was forwarded to the Secretary of State at Trenton, as required by law. Six of the incorporators are graduates of the *American Veterinary College*, three are graduates of the *Columbia Veterinary College*, two are graduates of the *Ontario Veterinary College*, two are graduates of the *Chicago Veterinary College* and one is a graduate of the *Royal Saxon College.*

The following are the officers elected at the meeting held in Patterson, August 4th :

President, J. C. Corlies, D. V. S , of Newark, N. J.

First Vice-President, Edwin R. Voorhoes, D.V.S., of Somerville, N. J.

Second Vice-President. Eldon L. Lobloin, D. V. S., of New Brunswick, N. J.

Secretary. William Herbert Lowe, D. V. S., of Paterson, N. J.

Treasurer. Ludwig R. Sattler, D. V. S., of Newark, N. J.

Censors. Andrew Shirk, V. S., of Newark ; Joseph Naylor, D. V. S., of Jersey City ; Elmore R. Mercer, D. V. S., of Montclair ; Matthew A. Pierce, D. V. S., of Paterson ; and Robert W. Carter, V. S., of Jobstown.

All except two of the newly elected officers had been members of the old association. They had disconnected themselves with it simply because they did not consider that it would be advantageous to them or to the veterinary profession of New Jersey to be associated with the non-graduates who were members. It appears that recently the non-graduates have taken a more active part in the affairs of the association than the graduates, for at a recent meeting it is alleged that four of the officers elected were non-graduates.

The following distinguished gentlemen were proposed by the secretary, for honorary membership, in the NEW JERSEY STATE VETERINARY SOCIETY.

Professor Liautard, Dean of the *American Veterinary College.*

Dr. E. M. Hunt, Secretary of the *New Jersey State Board of Health.*

Professor Rush S. Huidekoper, Dean of the *Veterinary Department of the University of Pennsylvania.*

William L. Zuill, M. D., D. V. S. of the same institution.

Dr. Salmon, chief of the *Bureau of Animal Industry*, Washington, D. C.

Prof. Chas. B. Michener, of the *American Veterinary College.*

Prof. Smith, Principal of the *Ontario Veterinary College.*

Prof. Law, of *Cornell University.*

Prof. C. P. Lyman, of *Harvard University.*

Prof. D. McEachran, of *Montreal Veterinary College.*

Dr. George Fleming, of London, England.

Prof. James L. Robertson, of the *American Veterinary Colle g* was proposed by Dr. Pierce.

Prof. Baker, Principal of the *Chicago Veterinary College* was proposed by Dr. Voorhees.

Prof. Dr. Leisering, *Geh. Med. R.*, *Germany*, was proposed by Dr. Sattler. All the above gentlemen were unanimously elected to honorary membership.

The objects of the new society, as stated in the certificate of incorporation, are :—"The promotion of fraternal feeling among its members; the welfare of the veterinary profession in general and of New Jersey in particular; the advancement of the science and art of veterinary medicine and surgery; aiming to protect the rights and privilege of practitioners, and to elevate the standard of the profession by scientific intercourse."

President Corlies appointed Dr. Krowl, of Passaic, Dr. DeClyne, of New Durham, Dr. Pocock, of Pennington, Dr. Loblein of New Brunswick, and Dr. Voorhees of Somerville, a committee on By-Laws.

The members decided to hold the next meeting in Newark, either in September or October, when the report of the Committee on By-Laws would be acted upon; and such other businesss transacted as may come before them at that time. The time of calling the meeting was left in the hands of the President.

Wm. Herbert Lowe, D. V. S.,
Secretary.

II. Ohio State Veterinary Medical Society.—The meeting was called to order by the president, Dr. J. C. Meyer, Jr., of Cincinnati, and Dr. W. A. Labron, of Xenia, occupied the secrctary's chair. The roll call revealed the following members present : Drs J. Yonkerman, and D. P. Yonkerman, Cleveland ; T. Kerr, Urbana ; Walter Shaw, Dayton ; E. R. Barnett, Akron ; C. S. Elliot, Greenville ; F. E. Anderson, Findlay ; J. A. Lee, Lima ; W. H. Gribble, Washington Court House ; W. C. Torrance, Cleveland ; R. G. Holland, Wellington ; Wm. McNaughton, Vienna ; W. C. Daniels, Cardington ; J. D. Fair, Berlin ; N. C. McLain, Jeromeville ; W. C. Fair, Cleveland ; A. H. Logan, Bellefontaine ; J. C. Meyer, Jr., Cincinnati ; J. V. Newton, Toledo ; L. A. Levercool, Norwalk ; A. Tanner, Ashtabula ; R. W. Whitehead, Youngstown ; W. E. Wright, Delaware ; L. D. Blanchard, Canton ; G. W. Butler, Circleville ; T. B. Cotton, Mt. Vernon ; J. Charlesworth, Springfield ; W. F. Derr, Wooster ; F. C. Groff, Massillon ; W. R. Howe, Dayton ; and W. A Labron, Xenia. The president delivered an address during which he spoke of the objects of the association and expressed his pleasure at the large attendance. The committee on veterinary legislation made a report. A bill in the interest of the veterinarians was introduced in the Legislature at the last session, but it was defeated because the lawmakers did not think that there were enough practical veterinarians in the State to do the business. The committee thought it best to petition the Legislature to pass a law preventing anyone from practicing the profession unless he had a diploma. Professor Smith, principal of the Ontario Veterinary college, was present, and made an address. He expressed pleasure in meeting so many of his old friends, not only graduates from his own college, but from others. He was equally well pleased to note the extreme harmony which prevailed among the profession in Ohio. The following new members were then admitted: Drs. W. G. Torrance, Cleveland; R. G. Holland, Wellington; W. H. Gribble, Washington Court House; Wm. McNaughton, Vienna; W. C. Daniels, Cardington; Benjamin C. McLain, Jeromeville; and J. D. Fair, Berlin. At two o'clock in the afternoon an operating session was held at Dr. Fair's veterinary infirmary, and a number of succesful operations were performed. Dr. J. C. Meyer, Jr., performed a delicate operation upon a dog, and Dr. F. E. Anderson treated a case of fistulous withers and removed the tumor. Dr. D. P. Yonkerman removed a melanatic tumor from a dog, and Dr. Butler operated on a ridgling horse. The association convened at 7 o'clock for the purpose of hearing papers, with Dr. Meyer in the chair. The first paper read was by Dr. D. P. Yonkerman. The subject was "Beef Inspection as a Part of Public Hygiene." The paper was exhaustive and treated this important subject in a concise and clear manner.

III. PENNSYLVANIA STATE VETERINARY MEDICAL ASSOCIATION.—The semi-annual meeting was called to order at the Hotel Albemarle, Pittsburg, on September 6th, by the President, Dr. T. B. Rayner.

On the roll call, Drs. T. B. Rayner, Chas. T. Goentner, W. L. Zuill, Jas. B. Rayner, N. Rectenwald, Jos. C. Fly, Geo. B. Rayner, Robt. Gladfelter, Jno. R. Hart, W. Horace Hoskins, answered present. Drs. Myers, Wall and Smith, and Mr. McNeill of Pittsburgh were present as visitors.

After the reading of the minutes of the annual meeting, Dr. Chas. E. Bridge, Phila., Dr. F. A. Wall and Dr. Smith of Pittsburg were proposed for membership.

The Board of Trustees on examination of the credentials of Dr. G. Myers, Allegheny, a graduate of Munich, Bavaria, recommended him favorably and on motion he was elected a member.

Appropriate resolutions relative to the loss sustained by the Association in the deaths of Drs. Michael W. Birch and A. H. Lovette, were reported by the committee and adopted.

The committee on legislation reported the progress of their work and asked for suggestions as to the very best way to completely canvass the State. After many suggestions it was decided to thoroughly district the State and by personal work arouse the people to the value of this bill.

Under the head of new business Dr. Hoskins offered a resolution that a permanent committee on Intelligence and Education be created by the President for the gathering and preserving of all information, etc., relative to the progress of the profession in the State.

Dr. Wm. L. Zuill offered a resolution creating a committee on Contagious Diseases or Sanitary Science and Police for the State. This committee to report at each meeting the condition of the live stock of our State.

After a short recess the meeting reconvened, and essays being in order, Dr. W. Horace Hoskins of Philadelphia, read an article on the Differential Diagnosis of Spinal Meningitis, Cerebro Spinal Meningitis and Azoturea, showing particularly the parts which age, character of animal, mode of onset, history of attack played in distinguishing the diseases. A very interesting and valuable discussion followed, participated in by Drs. Zuill, Jas. B. Rayner, Chas. T. Goentner, Hart and Wall, in which the recent outbreak of cerebro spinal meningitis in New Jersey, came in for much consideration.

After hearing the treasurer's report and the appointing of essayists, the meeting adjourned, to convene in Philadelphia in March, 1888

W. Horace Hoskins,
Secretary.

OBITUARY.

CHARLES A. MEYER, D. V. S.

It is with deep regret that we are compelled to announce the death of Charles A. Meyer, Doctor of Veterinary Science, which occurred after a short illness August 16th, 1887, Doctor Meyer was born in New York City, February 28th, 1852. He began the study of veterinary medicine in the New York College of Veterinary Surgeons in the fall of 1877, and when the greater part of the faculty of that institution resigned, and founded the Columbia Veterinary College, entered the new institution with the entire class. Among the enthusiastic group of students who inaugurated the first year of the Columbia Veterinary College, Mr. Meyer was one of the ablest and most diligent. Not only did he master the various theoretical and practical branches of the science, but endowed with mechanical and artistic skill, laid the foundation for the anatomical museum of his *alma mater* by contributing numerous osteological and other preparations, mounted with elegance and skill. He graduated with the highest honors April 23d, 1879, and was on this occasion awarded both the Wilson gold medal for general excellence in all departments and the prize for proficiency in anatomy. After graduating, Dr. Meyer entered the practice of his profession. He soon established a lucrative practice, and his opinion was often sought by his colleagues at considerable distances from the city. His clinical insight and bluff honesty alike endeared him to his professional and personal friends. It is to be regretted that so little of his large clinical experience is registered in a published form. An article on reflex paraplegia in the horse, from his pen, is to be found in the inaugural number of this journal, and most of his subsequent writings in the *Veterinary Gazette*, of which he was one of the editors, and which was discontinued after two years. He was one of the founders of the Academy of Veterinary Science and a member of the Masonic Order. He leaves no family, his wife having preceded him in death by a year. He was taken ill with several others who drank water from a contaminated well on Staten Island, about three weeks before his death. Symptoms of typhoid fever manifested themselves, an intestinal hemorrhage occurred, and he gradually sank. His funeral was attended by a large delegation of veterinary and medical friends from this and several neighboring states. The profession has lost an ornament, his relatives a good son and brother, and his more intimate associates, a friend whose place can not be filled. *Requiescat in pace.* ⁂

PROFESSOR SPENCER F. BAIRD.

Professor S. F. Baird, of the United States Fish Commission, died at Woods Holl, Massachusetts, on August 19th, 1887.

Spencer Fullerton Baird was born of Scotch-German ancestry in Reading, February 3d, 1835. At the age of 17 he was graduated from Dickinson College, and his time for several years thereafter was devoted to studies in general natural history, to long pedestrian excursions for the purpose of observing and collecting specimens, and to the organization of a private cabinet of natural history, which, a few years later, became the nucleus of the museum of the Smithsonian Institution. He studied medicine and attended a course of lectures at the College of Physicians and Surgeons in New York, in 1842, but never formally completed his course, although he received the degree of M. D., Honoris Causa, from the Philadelphia Medical College in 1848.

In 1845 he was chosen professor of natural history in Dickinson College, and was subsequently elected to the chair of natural history and chemistry in the same institution. In 1850 he was made assistant secretary of the Smithsonian Institute; at the age of 27 entered upon his life work in connection with that foundation. In 1871 he was appointed by President Grant to the position of United States Fish Commissioner, an unsalaried office, and in 1878, upon the death of Professor Henry, he was, by the unanimous vote of the Regents, elected secretary of the Smithsonian Institution.

Professor Baird received the degree of physical science from Dickinson College, and that of doctor of laws from Columbian University. He received several foreign decorations. He held honorary and corresponding memberships in many of the most renowned scientific societies in the world and active membership in most of those in America.

REVIEWS.

Report of the Chief of the Bureau of Animal Industry, Washington, 1887.

It may be safely asserted that no portion of the latest report made by the Commissioner of Agriculture is more interesting or important than that which was sent in by the Chief of the Bureau of Animal Industry.

The recent widespread prevalence of epidemic diseases among our most useful domestic animals has not only seriously affected an important branch of industry but has seriously diminished the sale and consumption of a leading article of diet. Passing over that portion of the report which is purely statistical and relates to the quarantine measures adopted by various states to limit the spread of epidemic diseases, we will consider more in detail the extremely interesting observation which Mr. Salmon has to offer touching the pathological peculiarities that characterize the diseases of swine. Mr. Salmon distinguishes swine plague from hog cholera on excellent grounds, inasmuch as the latter is the distinct product of a motile bacterium and the former is well-known in Germany as a disease which has its chief seat in the lungs. The bacterium whose presence is essentially connected with hog cholera, possesses a vitality which it is almost impossible to destroy, and consequently maintains its fatal energetic activity among the herds which it infests for prolonged and indefinite periods of time. Even in ordinary drinking water which is not supposed to offer a very favorable medium for the rapid development of bacilli, this microbe can multiply with extraordinary rapidity, whence the practical deduction has been drawn that infected streams into which fæces from sick animals find their way, are fraught with the utmost danger to those who draw their supply from such sources.

Its resistance to sterilization is so great that dessication produces but slight change in its capacity to multiply, and in the ordinary temperature of a room, small pieces of infected and dessicated tissue were found to contain traces of bacilli at the end of forty-nine days. Chemical substances and disinfectants manifested a similar inability to destroy the germs of hog cholera unless when their disorganizing energy was brought up to a very high degree.

Mr. Salmon extended his enquiries in this direction with wonderful painstaking and intelligence and deserves well of the scientific world for the valuable practical results, which his investigations has accomplished. Mercuric chloride and mercuric iodide he has found to be most speedily fatal to these bacilli, and that too in considerably diluted solutions, so that practically all other substances may be discredited as available destruents in large quantities, or for other than merely experimental purposes. And yet even the same per cent. solution of mercuric chloride, which destroys the bacterium, does not kill the spore. It does not follow, however, from this that there is a spore state properly, so-called, in the bacillus which thus resists the action of the chloride. The chapter on the modes of infection is one which ought to be read with close attention and a full appreciation of its contents by those who are financially interested in this question, for no intelligent means can be employed for the stamping out of this disease, which does not take into account the channels through which its seeds enter living organisms. Mr. Salmon conducted his experiments with great care and delicacy in order to determine the manner in which infection most readily spreads and effects an invasion, and found that the alimentary canal must be considered as the most vulnerable point for the entrance of the bacterium of hog cholera. His investigation of the conditions which marked and accompanied the outbreak of the hog cholera in Nebraska are likewise of great value, and may be viewed as possessing more than an ordinary practical interest, inasmuch as they have completely established the identity of the bacterium of Nebraska and his minute brother of the East. But the experiments looking towards the productions of immunity against the ravages of this destructive disease are still more interesting, since the prevention of a disease is a more *probable* result to hope for than its complete extinction.

Immunity by inoculation was tested on pigeons under a great variety of circumstances, and with very satisfactory results. But the same experiments repeated upon hogs failed to be attended with similar consequences, so that, in the present state of science, it may be affirmed that innoculation by healed and attenuated virus does not afford that immunity which the practice of Pasteur seemed to promise. How then can hog cholera be prevented? This is the absorbing question and on the answer to be given to it depends the permanency of very weighty interests. As was stated, the usual and, practically, almost the exclusive source of contagion is the fæcal discharge, since the large intestine is the invariable seat of the disease. Wherever the fæces are deposited they scatter the virus and thus the disease becomes indefinitely propagated. The bacteria thus deposited rapidly multiply in the wet soil, in the drinking water and the semi-liquid fluids of the hog pen. These facts unmistakeably point to the conclusion that sanitary and hygienic measures alone can effectively check the progress of hog cholera, and that, as in the case of those epidemics which attack the human family, strict isolation, quarantining, disinfection, scrupulous cleanliness, etc., can alone stamp out a plague which annually decimates valuable swine herds. Mr. Salmon's report is full and exhaustive, replete with scientific information on the minute anatomy and pathology of hog cholera, and must be regarded as a valuable contribution to the literature of general and epidemic diseases. C. M. OL.

A MANUAL OF VETERINARY HYGIENE, by Fred Smith, M. R.C.V. S. Lecturer on Military Veterinary Hygiene in the Army Veterinary School; co-editor of the *Quarterly Journal Veterinary Science* in India, etc. Price $3.50. New York : W. R. Jenkins, 1887.

Of the utility of Hygiene, no one having any practical experience in the care of animals will for a moment doubt; of the difficulty of obtaining correct information on the subject all will admit. By the publicity of the above work there is no longer any excuse for ignorance, for although other similar works of excellent character are to be found, none can compare with this as a text book of the principles and practice of Veterinary Hygiene.

By following its precepts veterinarians will be enabled to prevent many diseases, and save the lives of innumerable animals.

As the author points out in the introduction, hundreds of thousands of dollars can be saved annually by attention to this matter. Again, in the case of animals, the study of good effects of attention to hygiene is not complicated by the influence of mental condition, a factor which, in the case of man, makes it difficult to determine exactly the physical results.

The study of Hygiene in Veterinary Colleges should receive more attention than hitherto. To those engaged in the transportation of animals on ocean steamers this book will be of inestimable value.

Among the many subjects treated, the following are of interest: Water and its impurities, which cause more diseases than is heretofore believed. Ventilation of Stables. Food, and the value of different kinds. Diseases connected therewith. Vegetable and animal parasites. Drainage. Disinfection. Harness. Exercise and Labor, and the prevention and eradication of epizootic diseases

Of course, much has been drawn from other authors, especially Dr. E. A. Parker, the founder of modern hygiene, but it has been carefully adapted to the needs of the veterinarian. J. OL.

LIGAMENTS, THEIR NATURE AND MORPHOLOGY, by John Bland Sutton, F. R. C. S. Price $1.25. Philadelphia. J. Blakeston, Son & Co., 1887.

Here we have a very timely and valuable little treatise upon these important structures, wherein they are dealt with in that far-reaching and philosophic method for which the author of this work is now so justly distinguished—a method that fully meets the Baconian truism referred to in his preface, and which says, "No natural phenomenon can be studied in itself alone, but, to be understood, must be considered as it stands connected with all nature."

In this little manual Dr. Sutton has not only presented us with a very excellent account of the ligaments and fasciæ, but he has done more than this, for we have these structures traced through their ancestral histories and treated in their true and morphological aspects.

In the Introduction clear definitions are rendered for the "Metamorphosis" and "Regression of Muscle," and the "Degeneration of osseous and cartilaginous tissues," which several subjects are fully treated later in the work. Chapter III. is devoted to the Migration of Muscles in Relation to the Formation of Ligaments,—the migration of muscles being defined as "the changing of the situation of a muscle by alteration of its origin, or insertion, or both." Excellent comparative examples are produced to demonstrate these conditions. The remaining five chapters take up the ligaments of the various articulations and deal with them in a manner which will be sure to meet with the approbation, not only of the student of human anatomy, but the comparative morphologist. A valuable appendix presents a list of mammals that possess a well developed gleno-humoral ligament; and further we notice that the work is nicely illustrated by thirty-nine very useful figures.

In order to show how thoroughly Doctor Sutton has dealt with his subject, we may glance at his account of the *ligamentum teres*, which has for so long puzzled the best of anatomists for all ages. By careful comparative studies our author plainly shows it to be "the divorced tendon of a muscle" which in all probability belonged to the pectineus, but has become separated from it in consequence of skeletal modifications. The muscle known in birds as the ambiens, was found in an ostrich chick to be connected with this ligament and with a small muscular slip passing parallel with it, and as the ambiens and this muscular slip represent the pectineus of the mammalia, it is quite clear that this demonstration of the history of the ligamentum teres will prove to be the correct one. It is strongly supported in the same connection by comparisons of these structures in sphenodon, struthio, equus, and finally in man. This, however, forms no exception to the general character of the volume before us, for we find such important structures as the *epitrochleo anconeus* muscle; the palmar and plantar fasciæ; the lumbar apencurosis; the ligaments of the knee joint and of the pectoral arch; and indeed, of all other parts traced in the same lucid manner, and showing on every page the most painstaking research. Previous laborers in the same fields, are fully accredited with their work, and in every instance, the subject brought fully up to the present time. In conclusion, we may say that this little manual is one which students of anatomy can ill afford to be without, and it will be sure to prove an invaluable aid to the comparative morphologist.

R. W. S.

An Introduction to the Study of Embryology, by Alfred C. Haddon, M. A. (Cantab.) M. R. I. A., Professor of Zoology in the Royal College of Science, Dublin. Philadelphia. Price, $6.00; P. Blakiston, Son & Co., Philadelphia.

This excellent manual is the work of one of the foremost pupils of the lamented Balfour. Though lacking the completeness and elaborate illustrations of the two volumes which embodied the latter's life-work, it is superior to them in unity of plan, in clearness and in classification. Indeed, with the appended bibliography, it may be regarded, not alone as an introduction, but as a supplement to the larger work. The one hundred and ninety illustrations are, as a rule, simple and diagrammatic; few are original, and many are venerable. But they are well selected and happily elucidate the text. One of the most difficult tasks we can conceive, is the giving a succinct account of entogeny and phylogeny, embodying the main facts relative to the entire animal kingdom, in one volume. For medical and veterinary purposes we have always thought it the better plan to limit the text to the development of one species, illustrating differential and collateral points by means of foot notes. But with every bias in favor of this practical plan, it would be impossible to deny that Professor Haddon has done this difficult work very well. Brevity is the soul of thoroughness under such circumstances, and the author has certainly succeeded in presenting a large number of facts in a very small space,

The condition of the ovum before fecundation, is discussed in eleven pages, and closes with the description of the expulsion of the polar or directive bodies. The spermatozoon and its role, the penetration of its head into the ovum, its metamorphosis into the paternal pro-nucleus, and that wonderful phenomenon, the junction of the maternal and paternal pro-nuclei, which embodies the mystery of generative and individual existence and character, are next described, and illustrated by clear diagrams derived from Fol and Semper.

The formation of the blastoderm is illustrated by many good figures, and even to abnormalities to which it is liable are referred to and figured in part, (p. 42.)

The history of individual organs is unexceptional. The more modern views of Osborn regarding the corpus callosium in reptiles, of Ahlborm regarding the ocular nature of the pineal eye, and the segmental theory of the clavical nerves are ably presented. An original diagram illustrates very ingeniously the choroidal fissure of fowls, (p, 159.)

An appendix containing a classification of animals, as followed in the text, is a great aid to the reader. The index is an excellent one. We can cordially recommend this volume to embryologists, morphologists, human and veterinary medical students, as offering the best expose of the interesting theme with which it deals, thus far published in the English language. E. C. S.

HINTS ON THE BREEDING AND REARING OF FARM ANIMALS, by Thomas Walley, Principal, Royal (Dick.) Veterinary College, Edinburgh. Turnbull & Spears, Edinburgh.

This little book of sixty-eight pages is an enlargement of a lecture delivered before the Fife Farmers' Club, published in compliance with a request of the latter. It is a readable, concise exposition of the principles underlying the proper breeding of horses and other domestic animals. It is eminently calculated to appeal to conceited and wrong-headed breeders, who with notions derived from stable tradition, have done so much to depreciate stock by violating the laws which this book attempts to enforce and illustrate. Professor Walley is a strong believer in heredity, and he cautions against the employment of animals with acquired defects for breeding purposes, endorsing the decision of the directors of a prize cattle show, who threw out an award to a fine stallion because it had a "curb." He refers with just complacency to the fact that after having endorsed this decision "fate decreed" that he "unwittingly landed at the home of the condemned horse, and knowing that I had been to the show in question, one of the first questions asked by my entertainer was 'How did it come about that —— was awarded the £100 premium yesterday?' And the question was followed by the offer to show me, in the short space of two hours, twenty of the progeny of the particular horse, either with curbs or curby hocks."

It may be of interest to our readers to learn that in a case of a female twin calf, the sterility which female twin calves, or so-called "free martens," are afflicted with, was explained by the dissection, the organs of generation being absent or imperfect,

An excellent account of ergot, and the plants liable to this oxytoxic parasite is found on pages 36--42, in connection with the subject of abortion in cattle, which on the whole, is ably handled. The book concludes with some sound advice relative to the management of birth and of the new-born, and a parenthetical denunciation of bicycles, on which Professor Walley, as a confessed champion of the horse, looks with very little favor. C.

CATTLE AND DAIRY FARMING, Washington, 1887. This interesting volume of 855 pages issued by the Department of State at Washington, is a compilation of consular reports on cattle and dairy farming. It is splendidly illustrated, containing pictures of all the known breeds of cattle in Europe, Canada and South America, and is thoroughly exhaustive of the subject of which it treats. The following extract will show how cattle are killed in Basle:

"It consists of a mask or plate of iron, which fits the forehead of the animal, and is readily attached by straps which are fastened around the horns. In the center of the mask is fixed a steel gun 10 inches long, and of about .38 caliber, the breech being outward and provided with a steel needle, which, on being struck with a small hammer, explodes the ordinary metallic cartridge with which it is loaded. The barrel is fixed at such an angle to the interior surface of the mask that the bullet passes the center of the brain and is buried in the spinal marrow, producing instantaneous and painless death. The ox walks without fear or apprehension to the shambles, a touch is given to the fatal needle and the huge creature drops, utterly dead and incapable of suffering." C.

THE FARMERS' VETERINARY ADVISER. A guide to the prevention and treatment of disease in domestic animals, by James Law, Professor of Veterinary Science, Cornell University, Ithaca, 1887.

This is the eighth edition of Dr. Law's well known work that is now become a veterinary text-book in the various agricultural colleges. This edition has two new chapters devoted to the lung plague of cattle. The doctor gives an account of the introduction of this disease into this country, tracing it through the various states, the symtomology, course, termination and appearance of chest and lungs after death. He then takes up the subject of prevention, under the following heads: Total exclusion of foreign cattle and their unmanufactured products; importation subject to a quarantine which shall insure protection; restrictions on cattle from neighboring states. C.

TRANSACTIONS OF THE TEXAS STATE MEDICAL ASSOCIATION. Nineteenth Annual Session, held at Austin, Texas, April 26--29, 1887.

Nearly 500 pages are dedicated to the reports, addresses, etc., of this meeting. The book contains also the Constitution and By-Laws of the Association, as well as the Code of Medical Ethics adopted by it.

The *transactions* show that our Texan brethren are not afraid of labor, and the results of their intelligent efforts in the course of medical progress would be a credit to the highest medical assemblage in the Union. C.

THE JOURNAL OF THE BOMBAY NATURAL HISTORY SOCIETY. Edited by R. A. Sterndale, F. R. G. S., F. Z. S. Vol. II, No. 2. April 1887.

This number of the Journal contains articles on aquatic invertebrates of the waters of Western India, a catalogue of the Flora of Mahableshwar, and on the birds of India and Persia. A description is also given of a litter of hybrid wolf whelps, a cross between a village dog and a wolf, and the writer draws his conclusions that within the next twenty-five years the wolves in that vicinity may become domesticated. Eminent naturalists have decided that the anatomical structure of the wolf, its habits and physical development are very closely allied to the dog, especially in its osteology The only difference is in their oblique eyes. It is illustrated with a lithograph of two young Gibbons *Hylobates hoolook*, from Assam, drinking and walking. They walk erect, and drink by dipping the back of the hand into the liquid and then sucking off the moisture. C.

BOOKS AND PAMPHLETS RECEIVED.

BULLETIN OF THE IOWA STATE BOARD OF HEALTH. Des Moines,

BULLETIN OF THE MINNESOTA STATE BOARD OF HEALTH. Redwing.

LETTER ON THE HOG CHOLERA QUESTION, by Frank S. Billings, D.V.M., Director Laboratory, Lincoln, Nebraska.

CATALOGUE AND ANNOUNCEMENT VETERINARY DEPARTMENT UNIVERSITY OF PENNSYLVANIA, 1887–'88. Philadelphia.

ANNUAL ANNOUNCEMENT OF THE ONTARIO VETERINARY COLLEGE, Toronto Canada. Session 1887–'88.

PROSPECTUS ROYAL (Dick) VETERINARY COLLEGE. Edinburgh, 1887–'88.

ANNOUNCEMENT OF GROSS MEDICAL COLLEGE OF DENVER. Session 1887–'88.

ANNUAL REPORT OF THE PRESIDENT OF BROWN UNIVERSITY. Providence, 1887.

COMPARATIVE PSYCHOLOGY. By T. Wesley Mills, M. A., M. D. Reprint from Popular Science Monthly, March, 1887.

EXPERIMENTS ON THE PREVENTIVE INOCULATION OF RATTLESNAKE VENOM. By Henry Sewall, Ph. D., Professor of Physiology in the University of Michigan, Ann Arbor.

ANNUAL REPORT OF THE SPECIAL COMMITTEE ON SURGERY, 1886. Compiled and edited by George Cupples, M. D. From the Texas State Medical Association.

CONTRIBUTIONS TO THE COMPARATIVE CRANIOLOGY OF THE NORTH AMERICAN INDIANS. By R. W. Shufeldt, M. D. Reprint from the Journal of Anatomy and Physiology, Vol. 21.

NOTES ON THE VISCERAL ANATOMY OF CERTAIN AUKS. By R, W. Shufeldt, C. M. Z. S. Reprint, from the proceedings of the Zoological Society of London, 1887.

STUDIES FROM THE BIOLOGICAL LABORATORY. John Hopkins University. Vol, 4, Nos. 1 and 2. N. Murray. Baltimore.

REPORT OF THE ORNITHOLOGIST. C. Hart Merriam, M. D., for the year 1886. Reprint from the Report of the Agricultural Department, Washington, 1887.

PROCEEDINGS OF THE CANADIAN INSTITUTE. Toronto, Vol. IX. No. 2.

VERSLAG VAN DEN TESTAND VAN HET KONINKLIJK ZOOLOGISCHE-BOTANISCH GENOOTSCHAP TE. S.—Gravenhage, over het jaar, 1886.

BULLETIN OF THE AMERICAN MUSEUM OF NATURAL HISTORY. Vol. II. No. 1. May, 1887.

PROCEEDINGS OF THE LINNEAN SOCIETY OF NEW SOUTH WALES. Vol. II. part 1. Sydney, 1887.